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ABSTRACT

According to a 1996 study by the National Center for Education Statistics, 75% of America's colleges offer remedial courses and 29% of first-time freshmen take them. Community colleges typically spend more on remedial education than do four-year institutions, and they are anticipating increased demand for such programs. The study cites Howard Gardner, who identified eight different intelligences--musical, kinesthetic, mathematical, spatial, linguistic, interpersonal, intrapersonal, and naturalist. Gardner argues that Multiple Intelligences (MI) offers an intelligence fair means to consider an individual's potential. The purpose of this study was threefold: (1) to identify the dominant domains, specific skills, and predominant intellectual styles of remedial community college students using the Multiple Intelligences Developmental Assessment Scales (MIDAS) instrument; (2) to determine whether statistically significant differences exist among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity; and (3) to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains. Data was compiled from responses from 81 students in remedial classes at College of the Redwoods in California. Highlights of data analysis include: Women rated themselves higher in seven out if the eight MI domains; men rated themselves higher only in the kinesthetic domain; no significant differences were shown between minority and white students. (Contains 17 tables, five figures, 17 appendices, and 115 references.) (NB)

UNIVERSITY OF LA VERNE

La Verne, California

ASSESSMENT OF A REMEDIAL COMMUNITY COLLEGE COHORT FOR MULTIPLE INTELLIGENCES

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education
in Educational Leadership

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DEDICATION

To my very special partner, Rex Sinclair,

my loving parents, Marcellus and Stefania Ksicinski,

and my beautiful sisters and godchildren

Thus, the task is not so much to see
What no one yet has seen,
But to think what nobody yet has thought
About that which everybody sees.

--Schopenhauer

CHAPTER I

BACKGROUND OF THE PROBLEM

Introduction

The prime author and mover of the universe is intelligence.

St. Augustine

During the latter part of the twentieth century, the evolving field of cognitive science spawned a number of theorists who support the existence of multiple intelligence factors. One of the strongest advocates and a prolific writer in this area is Howard Gardner (1993a) of Harvard University. In a 1983 publication, Frames of Mind: The Theory of Multiple Intelligences, he presented a construct for multifaceted intelligence.

Codification of criteria to determine what constitutes an intelligence resulted in his definition of intelligence as "the ability to solve problems, or to create products, that are valued within one or more cultural settings" (Gardner 1993a, x). His research produced the following eight intelligences: musical, kinesthetic, mathematical, spatial, linguistic, interpersonal, intrapersonal, and naturalist. Gardner believes that Multiple Intelligences (MI) offer an intelligence fair means to consider an individual's potential. Although Gardner originally

intended MI for psychologists, there has been an overwhelming response and interest from educators. Much work, especially at the elementary and secondary levels, has been done to support the idea that there are many ways to be smart. MI theory encourages educators to consider the question, "How are you smart?" not, "How smart are you?" (Shearer 1996b, 2).

In 1987, C. Branton Shearer of Kent State University began constructing Multiple Intelligence instruments. A decade later, he had developed three separate instruments for different age groups based on MI theory. Shearer's Multiple Intelligence Developmental Assessment Scales (MIDAS) are based on the eight domains with specific skill subscales as defined in Gardner's (1993a) Frames of Mind: The Theory of Multiple Intelligences. A series of research and development projects established reliability and validity for measurement of perceived intellectual disposition. Revision and refinement included field-testing and commentary by expert reviewers such as Howard Gardner (Shearer 1996a).

The MIDAS instrument generates "information regarding intellectual development, activities, and propensities not generally available from standard intelligence and most aptitude tests" (Shearer 1996a, 1). This assessment method provides realistic data on a broader spectrum of dimensions for informed choices and is based upon the philosophy of personalized education.

The purpose of the MIDAS is to provide a quantitative as well as qualitative description of a person's intelligence profile. The goal is to increase

an individual's understanding and appreciation for his/her intellectual profile in order to increase personal satisfaction and achievement.

Statement of the Problem

MI research has produced numerous studies at the precollegiate level with a growing body of literature demonstrating the impact of an MI approach. A review of dissertation abstracts from 1992 disclosed that only four of eighty-six studies were conducted at the postsecondary level. Two of these research projects involved computer science and the other two focused on the disciplines of art and theater.

Because limited MI research has been done beyond high school level, the impact on teens and adults is unexplored. There are several significant reasons that the community college level is an important arena to investigate the realm of Multiple Intelligences. First, nearly 45 percent of higher education students are enrolled in community college systems but there is very little research with this population. Second, community colleges are experiencing a tremendous growth in, and a growing problem with, students entering at the remedial level (Pascarella and Terenzini 1998, 157).

According to a 1996 study by the National Center for Education Statistics, three-quarters of America's colleges offer remedial courses and 29 percent of first-time freshmen take them. Community colleges typically spend more on remedial education than four-year institutions. In addition, the four-year systems

of large states such as California and New York and cities such as Chicago are beginning to limit the time students can devote to remedial courses. Hence, community colleges are anticipating increased demand for remedial instruction (Jones 1998).

U.S. Department of Education research analyst, Clifford Adelman, has documented that remedial programs can be successful with students who need only minimal help. A national study of college transcripts (for both two- and four-year institutions) showed that 55 percent of students who took no remedial courses eventually earned a degree. Forty-seven percent who took only one remedial course succeeded. However, only 24 percent of those who took three or more remedial courses earned a degree (Jones 1998, 2). The reduced success rate for students who take more than one remedial course necessitates consideration of new mechanisms to help these students.

This situation indicates that community colleges have a unique opportunity and a need to investigate methods to improve success rates for remedial students. Currently, community colleges use assessment instruments to determine initial placement in mathematics and English courses. Focusing on verbal and analytical skills, these tests do not define characteristics or strengths that help maximize success. Low scoring students are placed at levels at, or below high school level. Typically, the success rates in these courses are extremely low. A report by Janis Cox Jones (1996) states that "fewer than one out of six of our students ever move successfully from remedial courses" (n.p.).

Thus, a study to identify dominant MI domains that affect remedial community college students could provide critical information for higher education institutions seeking to improve retention rates. Furthermore, by identifying the specific skills and predominant intellectual styles and the differences between teachers and students, it would be possible to design appropriate intervention strategies to improve success rates for this at-risk population.

This study may be of interest to the students, instructors, counselors, and administrators at community colleges who are concerned with improving retention and success rates for remedial students. The results of the study are relevant on the local, state, and national levels.

Purpose of the Study

The purpose of this study was to identify, according to the MIDAS instrument, the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. A second purpose was to determine whether statistically significant differences existed among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity. A third purpose was to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains.

Research Questions

1. What are the dominant MI domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

   a) Musical

   b) Kinesthetic

   c) Mathematical

   d) Spatial

   e) Linguistic

   f) Interpersonal

   g) Intrapersonal

   h) Naturalist

2. What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

3. What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

4. Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

Definitions of Terms

The following definitions of significant terms are provided to assist the reader in understanding the procedure, literature, and results of the study.

Domain. "A domain is an organized set of activities within a culture, one typically characterized by a specific symbol system and its attendant operations" (Gardner 1995b, 202). The definitions of the domains or the eight intelligences, in Gardner's words, are

A. Musical intelligence is the capacity to think in music, to be able to hear patterns, recognize them, and perhaps manipulate them.

B. Kinesthetic intelligence is the capacity to use your whole body or parts of your body—your hand, your fingers, your arms—to solve a problem, make something, or put on some kind of a production.

C. Mathematical intelligence (people) understand the underlying principles of some kind of a causal system, the way a scientist or a logician does, or can manipulate numbers, quantities, and operations, the way a mathematician does.

D. Spatial intelligence refers to the ability to represent the spatial world internally in your mind.

E. Linguistic intelligence is the capacity to use language, your native language, and perhaps other languages, to express what's on your mind and to understand other people.

F. Interpersonal intelligence is understanding other people.

G. Intrapersonal intelligence refers to having an understanding of yourself, of knowing who you are, what you can do, what you want to do, how you react to things, which things to avoid, and which things to gravitate toward.

H. Naturalist intelligence designates the human ability to discriminate among living things (plants, animals) as well as sensitivity to other features of the natural world (clouds, rock configurations). (Cited in Checkley 1987, 6-7)

Specific skills. Skills are measured through twenty-six subscales that describe the individual's overall intellectual disposition including skill, involvement, and enthusiasm within each of the domains or intelligences. The subscales are:

A. Musical
   1. Appreciation
   2. Instrument
   3. Vocal
   4. Composer

B. Kinesthetic
   1. Athletic
   2. Dexterity

C. Mathematical
   1. School math
   2. Logic games
   3. Everyday math
   4. Everyday problem solving

D. Spatial
   1. Spatial awareness
   2. Art design
   3. Working with objects

E. Linguistic

1. Expressive
2. Rhetorical
3. Written/reading

F. Interpersonal

1. Persuasion
2. Sensitivity
3. Working with people

G. Intrapersonal

1. Personal knowledge
2. Calculations
3. Spatial problem solving
4. Effectiveness

H. Naturalist

1. Science
2. Animal
3. Plant

Intellectual styles. Three intellectual styles of Leadership, Innovation, and General Logic are derived from selected items in the eight domains to define what Gardner called higher level horizontal cognitive abilities. Leadership is comprised of fifteen items primarily from the Linguistic and Interpersonal scales that focus on the ability to use language to organize and solve problems.

Innovation is determined by eighteen questions from all the domains in order to assess ability to think, create, and problem solve in unique ways. General Logic is derived from twenty questions in the Mathematical, Spatial, Interpersonal, and Intrapersonal domains that characterize convergent thinking for practical solutions to problems (cited in Shearer 1996a).

Remedial. A remedial community college student is defined as an individual whose analytical and verbal entrance assessment scores indicated placement at high school level mathematics and/or English.

Organization of the Study

Chapter I presented a description of the study and its focus on the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. The background of the problem, problem statement, purpose statement, research questions, and definitions of terms were included.

Chapter II provides a review of the literature describing the derivation, description, and educational implications of Gardner's (1993a) MI theory. Discussion of assessment and remediation in higher education concludes with consideration of MI application to remediation in higher education. Various instruments are discussed and the instrument selected for this study is described.

Chapter III addresses the methodology of this study including the research type and design, a description of the setting, as well as the sample and population. The reliability and validity of the chosen instrument are discussed. The data collection procedures and the limitations of the study are also considered.

Chapter IV presents the findings from the study and an analysis of the data. Chapter V includes a summary of the research, conclusions drawn from the study, recommendations for actions based on the results of the study, and implications for future research.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The mind is not a vessel to be filled, but a fire to be kindled.

Plutarch

Humans have long pondered the essence of humanity. The quest for knowledge and those capacities that define knowing has been a subject of all ages. The debate has been framed in numerous ways. Socrates who stated "Know thyself" hypothesized that individuals inherit different capabilities at birth. Descartes, who postulated "I think: therefore I am" argued that the mind is the source of our most certain knowledge (Gardner, Kornhaber, and Wake 1996, 32-33). Great minds have been, and continue to be, consumed by the importance of mental powers.

Many attempts have been made to establish systems to categorize and classify the nature of intelligence. The earliest systematic efforts to explore the fundamental questions of intelligence are credited to the Greek philosophers. Aristotle developed a formal system of logic to test hypotheses and make deductions. St. Augustine offered a lofty poetic viewpoint that "of all human

pursuits, the pursuit of wisdom is the most perfect" (Gardner 1993a, 6). Kant maintained there could be no science of the mind because it lacked a material basis (Gardner, Kornhaber, and Wake 1996).

Although enticing, a journey into this historical intellectual abyss led to infinite possibilities. Because Howard Gardner's scholarly endeavors explored historical predecessors, his writings are a solid foundation and framework for analysis. Gardner (1993a) presented a survey of intelligence in Frames of Mind (MI) that challenged the classical view of intelligence. Later writings including Intelligence Multiple Perspectives (Gardner, Kornhaber, and Wake 1996) amplified on the historical roots of his MI theory and its implications.

It therefore seemed prudent to summarize MI's derivation as well as its distinction from other multifaceted theories primarily from Gardner's writings (1990; 1991; 1993a; 1993b; 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b). Commentary from proponents and detractors of MI helped develop a basis for understanding its educational implications. The critical issues of assessment and remediation in higher education were researched in an attempt to determine whether MI theory had, or could reveal new strategies for an at-risk population.

Chapter II reviews the literature pertaining to these topics as follows:

1. Derivation of Multiple Intelligence (MI) Theory
2. Definition and Educational Implications of MI Theory
3. Assessment of Intellectual Capacity

4. Remediation in Higher Education
5. Application of MI to Remediation in Higher Education
6. MI Assessment Instruments
7. Interpreting the MIDAS Instrument
8. Summary

Derivation of Multiple Intelligence Theory

A primary distinction about intelligence has focused on the "contrast between two attitudes toward the mind which have competed and alternated across the centuries . . . a singular, inviolable capacity (that) each individual is born with a certain amount of intelligence. . . . An equally venerable tradition of the West glorifies the numerous distinct functions or parts of the mind" (Gardner 1993a, 7).

Gardner (1996b) embraced the multifaceted approach admitting that "the idea of multiple intelligences is an old one, and I can scarcely claim any great originality for attempting to revive it once more" (11). He credited his revisionist MI theory to the emerging field of cognitive science. Summarizing and synthesizing other scholars' work, Gardner's MI constituted "a cognitive record of the evolutionary past" best thought of as a "biopsychological construct" (4-5).

According to Gardner (1993a), the scientific study of intelligence began approximately a century ago. He commenced his survey of intelligence with Franz Joseph Gall's Phrenology. Correlating brain size and skull shape with an

individual's intellect was a fascinating but flawed claim. Nonetheless, Gall was "among the first modern scientists to stress that different parts of the brain mediate different functions" (Gardner, Kornhaber and Wake 1996, 35) and "there exist different forms of perception, memory, and the like for each of the several intellectual faculties" (Sternberg 1989, 38).

In the 1860s, physicians and scientists including Pierre-Paul Broca demonstrated the relationship between a specific brain lesion and a particular cognitive impairment. This localization of brain functioning paved the way for scholars who earnestly sought to establish the science of psychology.

Francis Galton, cousin of Charles Darwin and proponent of inherited intelligence, was perhaps the first scientist to launch studies that attempted to measure intellect (Gardner and Hatch 1990). This British mathematician developed statistical methods to rank humans in terms of their physical and intellectual powers according to various sensory discriminatory tasks. Galton believed that intelligent persons were characterized by especially keen sensory capacities (Gardner 1993a).

The influential work of Alfred Binet, a Frenchman, led the scientific community to look at complex capabilities in order to gain a more accurate assessment of intellectual powers. Working with Theodore Simon, Binet devised the first intelligence tests. These tests were used to place children at appropriate grade levels as well as to help identify retarded youths. Thus was born the psychometric approach that sought to define intelligence through measurable

tests organized in graded levels of difficulty for different chronological ages (Gardner 1993a).

Although Binet did not argue that intelligence was inherited or fixed, his work helped fuel the eugenics movement. German psychologist, William Stern devised a formula to get a better sense of a child's mental functioning. The growth of mass education and the outbreak of World War I brought new fervor to the testing mania (Gardner, Kornhaber, and Wake 1996).

The debate between singular and multifaceted intelligence intensified. British educational psychologist, Charles Spearman conducted correlation studies that supported a general factor of intelligence (the g). Belief in intelligence as a single general capacity led Lewis Terman and others to adapt Binet's work, and to refine the idea of the Intelligent Quotient, or IQ (Hoff 1999; Gardner 1993b)

Factor analysis led to an assault on the general intelligence theory. American psychometrician, L. L. Thurstone claimed there were seven primary mental abilities that were relatively independent and could be measured by different tasks. J. P. Guilford's structure-of-intellect model proposed 120 factors (Sternberg 1994). Some scholars of pluralized intelligence, such as Raymond Cattell and Philip Vernon, argued for a hierarchical relationship among factors (Sternberg 1989; Gardner, Kornhaber, and Wake 1996).

Credit is also given to the developmental psychologist, Jean Piaget whose studies proposed that a child's skill and ability advanced through predictable

growth stages. The subsequent information-processing approach investigated the finest detail and sequence of tasks, thereby focusing on the mechanical aspects of intelligence.

Gardner (1990) surmised that the new cognitive science movement drew upon multiple fields of study. In The Mind's New Science: A History of the Cognitive Revolution, he detailed the developments in philosophy, psychology, linguistics, anthropology, artificial intelligence, and neuroscience that together helped give birth to cognitive science. Current views of cognition derive from the confluence of this large body of evidence from various sources (Gardner 1993a). By the latter part of this century, two new trends of contextualization and distribution surfaced. The influential work of Yale professor Robert Sternberg, Soviet psychologist Lev Vygotsky, and Cornell's Stephen Ceci explored intelligence as part of larger contexts or cultures. Intelligence was defined by the artifacts and individuals surrounding the person as much as innate ability. Placing himself in this generation of psychologists, Gardner admitted that his work encompassed contextualization and distribution approaches to defining intelligence.

In Frames of Mind, Gardner (1993a) proposed a symbol systems approach based on the premise that human cognition is distinguished by the deployment of various symbols. The challenge was to compose a developmental portrait of the different symbolic competencies to determine connections and distinctions between and among different domains.

The copious writings of Gardner (1990; 1991; 1993a; 1993b; 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b) demonstrate the breadth and depth of his mental explorations. His synthesis of historical precedents presented a fascinating story as well as a compelling and conscientious scholarly endeavor to comprehend previous achievements. It is, therefore, not surprising that his Multiple Intelligences Theory embraced beliefs and values derived from the influences of his own broad-based academic studies. There is little doubt that Gardner's work is truly a contextualized intelligence theory.

Definition and Educational Implications of MI Theory

The definition of intelligence has been endlessly debated and surrounded by much controversy. Many Western psychologists widely believe intelligence involves the ability to carry out abstract problem solving (Hoerr 1996b). There are numerous dissenters who consider this a parochial viewpoint because abstract thinking itself defies definition. This definition conundrum is related to an underlying dilemma that those most concerned with studying intelligence were educated in a system whose model of intelligence was mastery of subjects and skills (Gardner, Kornhaber, and Wake 1996).

Hence, it is hardly surprising that Gardner (1993a) presented this intellectual paradox: "Because intelligence is a concept without an agreed-on definition, what counts as intelligence depends on whom you ask, the methods the respondents use to explore the topic, the level of analysis of their

investigation, and the values and beliefs they hold" (4). A more whimsical definition put forth by psychologists claimed that "intelligence is what the tests test" (Veenema and Gardner 1996, 69; Gardner, Kornhaber, and Wake 1996, 5).

> To encompass adequately the realm of human cognition, it is necessary to include a far wider and more universal set of competencies than we have ordinarily considered. And it is necessary to remain open to the possibility that many—if not most—of these competencies do not lend themselves to measurement by standard verbal methods, which rely heavily on a blend of logical and linguistic abilities. With this consideration in mind, I have formulated a definition of what I call an "intelligence." An intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings. (Gardner 1993a, x)

The synthesis of significant bodies of scientific evidence led Gardner (1993a) to believe that "there exists a multitude of intelligences, quite independent of each other; that each intelligence has its own strengths and constraints; that the mind is far from unencumbered at birth" (xix). Based on biological and anthropological evidence, he introduced distinct criteria to determine an intelligence. Candidate intelligences were judged according to the following:

- Potential Isolation by Brain Damage
- Existence of Idiot Savants, Prodigies, and Other Exceptional Individuals
- An Identifiable Core Operation or Set of Operations
- A Distinctive Developmental History, Along with a Definable Set of Expert "End-State" Performances
- An Evolutionary History and Evolutionary Plausibility
- Support from Experimental Psychological Tasks
- Support from Psychometric Findings
- Susceptibility to Encoding in a Symbol System (60-66)

Screening of candidate intelligences using these criteria resulted initially in the naming of the following seven intelligences with an eighth being added several years later:

1. Musical: Sensitivity to pitch, melody, rhythm, and tone
2. Kinesthetic: Ability to use the body skillfully and handle objects adroitly
3. Mathematical: Ability to handle chains of reasoning and to recognize patterns and order
4. Spatial: Ability to perceive the world accurately and to recreate or transform aspects of the world
5. Linguistic: Sensitivity to the meaning and order of words
6. Interpersonal: Ability to understand people and relationships
7. Intrapersonal: Access to one's emotional life as a means to understand oneself and others
8. Naturalistic: Ability to recognize flora and fauna and other distinctions in the natural work (Hoerr 1996c, 9-10)

According to MI, these eight intelligences are a set of human intellectual potentials, of which all individuals are capable by virtue of membership in the human species. Some individuals develop certain intelligences more than others, but every normal person should develop each intelligence to some extent (Gardner 1993a). The individual intelligences are independent, but closely related. Increased proficiency in one area can enhance the whole constellation of intelligences (Dickerson 1998; Edwards 1995; Gardner and Hatch 1990).

MI theory supports the notion that intelligence can be learned and taught; and that mental functioning can be improved at any age and almost any ability

level. "Intelligence is a multi-dimensional phenomenon that occurs at multiple levels of our brain/mind/body system. There are many ways by which we know, perceive, learn, and process information" (Lazear 1992, 8-9). Possession of an intelligence should be perceived as a potential, that is, a skill and ability of how to execute something. Multiple intelligences exist not as physically verifiable entities but rather as potentially useful scientific constructs (Gardner 1993a).

Gardner (1993a) suggested that the various intelligences are actually competencies, a set of natural building blocks out of which productive lines of thought are built. He used the analogy of intelligences as elements in a chemical system. "Basic constituents can enter into compounds of various sorts and into equations that yield a plethora of processes and products" (279). Further deconstructing the intelligences, Gardner purported that: "At the core of every intelligence, there exists a computational capacity, an information processing device, which is unique to that particular intelligence, and upon which are based the more complex realizations and embodiments of that intelligence. 'Core' components might be phonological and grammatical processing in the case of language; tonal and rhythmic processing in the case of music" (278).

These core components of the intelligences are characterized by their symbolic activity. When information is presented, the nervous system is triggered to carry out specific operations. Symbols span the gap between the structures and functions of the nervous system and the roles and activities of culture. From repetition, elaboration, and interaction among computational

devices eventually flow forms of knowledge that Gardner (1993a) termed "intelligent" (278).

Gardner (1993a) concluded that if his construct of human intelligences was specific, it should be possible to generate a list of all symbol systems. Such a list would indicate to educators the possible symbols of meaning and what individuals might be expected to master in their culture. The introduction and mastering of symbolic systems "might be regarded as the principal mission of modern educational systems" (302).

Postulating a new and more viable model of intelligence, Gardner has sought to implement his MI Theory at the Harvard Graduate School of Education through research with students and associates in laboratory instructional classrooms including Project Zero and Project Spectrum. Placing the learner at the center of the education process, concern is given to the different ways individuals learn at various stages of life. Studies have also been directed to the ways individuals perceive the world and express ideas (Project Zero homepage 1998; Brockman 1997).

Thomas Hatch (1997), a former student of Gardner and research associate of Project Zero, described the MI approach:

> To go beyond common intelligence tests and formulate much more useful hypotheses about the kinds of activities in which a child does—or will—excel, we must take into account not only the child's specific interests and development, but also the opportunities and resources available to that child. Further, we must constantly question our assumptions about that child's strengths and about intelligence in general. And we must be willing to understand and respond to that child as an individual. (29)

Educators have embraced MI in part because it explained what they have long experienced in the classroom (Latham 1997). MI is "a way of thinking, it is an attitude about people which allows for similarities and differences. It allows for inclusion and enrichment, for self-esteem building and the development of respect for each individual and the gifts they bring to the classroom" (Beckman 1998, n.p.). "Gardner's theory is a dream come true for teachers—because it means intelligences can be nurtured" (Nelson 1998, 2).

MI "implies that educators should recognize and teach to a broader range of talents and skills . . . (to) facilitate a deeper understanding of the subject material" (Brualdi 1996, 2). As students succeed, they build self-confidence and love for learning. Classrooms come alive with options and opportunities as the students and teachers learn together (Hoerr 1996b, 19).

"A principal value of the multiple intelligence perspective be it a theory or a 'mere' framework lies in its potential contributions to educational reform. . . . Progress seems to revolve around assessment. . . . Further development of MI Theory requires a fresh approach to assessment, an approach consistent with the view that there are a number of intelligences that are developed and can best be detected in culturally meaningful activities" (Gardner and Hatch 1990, 4).

Gardner and Hatch (1990) hoped that the provocative nature of MI would stimulate new thinking and promote educational reform. Because of the fundamental nature of assessment, they recognized that change would require reconsideration of meritocratic exams. The next section examines the history of

intellectual testing in order to explore how current assessment practices define and confine educational systems.

Assessment of Intellectual Capacity

"Researchers do not agree on what intelligence is, and therefore what tasks might be used to assess it" (Gardner, Kornhaber, and Wake 1996, 30). Despite this controversy, meritocratic examinations remain a prominent feature of the educational landscape. Much like the Chinese civil service and European practices, the early American history of testing focused on classical subjects. Each college had its own exam based on traditional content because knowledge in these areas demonstrated a student's general faculties of reasoning and memory.

At the turn of the current century, the United States did not have national high school requirements or university admission standards. The College Entrance Examination Board was launched in 1900 to develop uniform examinations, although colleges were still free to admit students based on their own criteria. The early exams emphasized synthesis of information and coherent expression and therefore involved subjective scoring. Considerations of efficiency and perceived fairness led to tests and scoring that were more objective in nature (Gardner, Kornhaber, and Wake 1996; Hoff 1999).

The first intelligence tests developed by Binet and Simon in France helped provide momentum for uniform measurable exams in the U.S. With the large

scale testing of World War I, army recruits for personnel placement, intelligence testing based on short answers and problem solving grew in practice. After the war, the National Intelligence Test that could be mass administered to school children was advocated. Although popular, these short-answer exams that encouraged defining intelligence were culturally and racially biased. Differences in levels of achievement supported the then current theories of racial superiority and spawned the widespread practice of tracking (Gardner, Kornhaber, and Wake 1996; Hoff 1999).

Standardized tests became increasingly popular throughout the remainder of the century despite apparent shortcomings and detractors. Use of statistical analyses fostered the notion that performing well on intelligence tests was a sign of intelligence (Gardner, Kornhaber, and Wake 1996). These tests have become societies' "education gatekeeper" (Latham 1997, 84), and are now tools of government that influence what is taught and how it is taught (Hoff 1999).

> Most scholars . . . are now convinced that enthusiasm over intelligence tests has been excessive and that there are numerous limitations in the instruments themselves and in the uses to which they can (and should) be put. Among other considerations, the tasks are definitely skewed in favor of individuals in societies with schooling and particularly in favor of individuals who are accustomed to taking paper-and-pencil tests, featuring clearly delineated answers. (Gardner 1993a, 16)

Binet-Simon type tests have some predictive power for success in primary and secondary schooling, but are much less predictive for postsecondary academic and occupational domains. "Present measures of intelligence are inadequately sampling the wider domain of adult intellect . . . adult performance

is greatly influence(d) by prior topic and domain knowledge . . . Thus, the content of intellect is at least as important as the processes of intellect in determining an adult's real-world problem-solving efficacy" (Ackerman 1996, 1).

Intelligence tests typically fail to explain variations that exist outside the testing situation. Most probe for knowledge gained in a specific social and educational milieu and reveal little about an individual's potential for future growth (Gardner 1993a). Emphasizing a narrow band of thinking, the focus usually is on language and mathematics, or *academic intelligence* (Hoerr 1996b; Gardner, Kornhaber, and Wake 1996).

"Conventional academic intelligence tests account for less than 10 percent of the individual variation differences in actual performance" (Sternberg 1996a, 18). These tests place a high premium on *crystallized* or acquired knowledge and less emphasis on *fluid* knowledge or the ability to learn new things and draw from one's learning in a new situation (Gardner, Kornhaber, and Wake 1996).

New Zealand political scientist, James Flynn reported that IQ scores have risen sharply over the past sixty years. The significant change in IQ scores is an indicant that the test measures are mutable (Williams 1998). To explain this rapid change, researchers have looked at cultural factors including health and nutrition. Gardner, Kornhaber, and Wake (1996) have acknowledged that both nature and nurture are determinants of intelligence: "at least 30% and perhaps

as much as 50% of the variation in intelligence is due to factors other than the identity of one's biological parents" (152).

Some of the increase has also been attributed to growing familiarity with intelligence tests. This point was well-illustrated when the College Board started marketing coaching services in 1998. "Critics of standardized testing say the service shows that the SAT measures students' success at being coached—and their ability to pay for help—rather than gauging their innate intelligence" (Guernsey 1998, A39).

Given the recent developments in intelligence research, it is difficult to understand why intelligence tests remain so popular. Yekovich (1994) says "that market forces [i.e., the demands of test consumers] have retarded the development of new, more appropriate measures of intellectual abilities . . . signs of change are appearing, but until they gain more momentum, current instruments, no matter how inadequate, will continue to be the standard" (2-3).

The ivory tower of the mental measurement establishment is far from crumbling. There is little organized opposition to the entrenched testing system. Americans are obsessed with IQ and generally accept the current system as inexpensive and efficient. However, the antitesting movement is mounting evidence that questions the predictive power of intelligence tests. Research is demonstrating that standardized tests tend to penalize low socioeconomic groups including minorities and women. Educational Testing Service now claims that its SAT is not an *aptitude* test, but an assessment of developed abilities

(Sacks 1997). Researchers are finding that IQ tests fail to measure many abilities that determine success at college as well as in the workplace. "Scoring high on standardized tests is a good predictor of one's ability to score high on standardized tests" (27). "The realization is growing that we need to characterize and measure more of the abilities that are important to adult success. . . . Increasingly, we need to think in terms of types and facets of intelligence that lead to success in specific contexts . . . As we look ahead to the demographic changes underway and recognize the need to distribute educational and employment opportunities fairly and broadly, it becomes even more essential for us to assess people's capabilities accurately" (Williams 1998, A80).

Gardner (1993a) and his advocates devoted considerable effort to assessment, in particular, the search for an *intelligence fair* means to measure intellectual strengths without going through the lenses of language and logic. He stated that "it seemed ill-advised, and perhaps impossible, to attempt to measure the 'raw' intelligence" (xvi-xvii).

> There must be more to intelligence than short answers to short questions—answers that predict academic success, and . . . a better way of thinking about intelligence, and better ways to assess an individual's capabilities . . . the current methods of assessing the intellect are not sufficiently well honed to allow assessment of an individual's potential or achievements. . . . The problem lies less in the technology of testing than in the ways in which we customarily think about the intellect and in our ingrained views of intelligence. Only if we expand and reformulate our view of what counts as human intellect will we be able to devise more appropriate ways of assessing it and more effective ways of educating it (Gardner 1993a, 4).

Over thirty years of MI-related research at Harvard Graduate School of Education has been documented in more than five hundred published articles and books. Topics include ongoing assessment as an integral part of the curriculum and developing assessment criteria and procedures that show a student's full range of abilities. Innovative assessment methods such as special projects, portfolios, and videotaping have been explored to evaluate different forms of learner thinking (Project Zero homepage 1998).

"MI theory proposes a fundamental restructuring of the way in which educators assess their students' learning progress. It suggests a system that relies far less on formal standardized or norm-referenced tests and much more on authentic measures that are criterion-referenced, benchmarked, or ipsative" (Armstrong 1994, 115). According to Gardner (1996b), "we cannot assess intelligence. We can at most assess proficiency in different tasks . . . the greater number of tasks sampled the more likely it is that a statement about 'strength' or 'weakness' in an intelligence will acquire some validity" (4-5).

"Howard Gardner talks about assessment of the intelligences in terms of constructing an 'intelligence profile' on students. This is somewhat akin to putting together a jigsaw puzzle" (Lazear 1992, 36) in which the teacher discerns students' strengths and weaknesses in order to define how they learn information (i.e., their learning style). Although it is impossible to teach to all styles, the teacher can show students how to use more developed intelligences to assist in understanding a subject that employs weaker intelligences. Knowing

a student's strengths and weaknesses also provides the opportunity for a more accurate assessment of the learner's progress (Brualdi 1996).

Reports about MI implementation are growing (Campbell 1989; Campbell 1997; Latham 1997). MI "has inspired a number of research-and-development projects that are taking place in schools ranging from preschool through high school" (Gardner and Hatch 1990, 8). Entire issues of educational publications such as the September 1997 Educational Leadership, the November 1996 NASSP Bulletin, and the December 1995 English Journal have been devoted to reports by MI practitioners.

Teachers restructuring learning environments to an MI approach have indicated that lesson plans are more thematic and interdisciplinary. Developing diverse MI activities was initially extremely challenging and expanded their own multiple intelligence abilities. As their role changed to a facilitator of learning, teachers reported experiencing personal growth in creativity as well as multimodal thinking and learning. Students increased multimodal skills, with improved attitudes, motivation, and behavior (Campbell 1989; Gardner and Hatch 1990).

Initial findings from research projects by Gardner's students suggest that MI helps schools in several ways:

> It offers a vocabulary for teachers to use in discussing children's strengths and in developing curriculum; it validates the practices of teachers whose work is already synchronous with MI theory; it promotes or justifies education in diverse art forms; and it encourages teachers to work in teams, complementing their own strengths with those of their colleagues. It also

> encourages schools to devise rich educational experiences for children from diverse backgrounds. (Krechevsky and Kornhaber, 1998. n.p.)

Nonetheless, there are those who proclaim that Multiple Intelligences have merely muddied the assessment waters. MI could result in further stigmatizing of people who can be made to feel inadequate across more realms (Osburg 1995). Hence, boys may be defined as bodily-kinesthetic, girls as more linguistic, or girls are better in A intelligence than in B. Gardner (1993a) responded:

> I do not think the abuses of intelligence testing ought in any sense to be imported to multiple intelligence theory. Indeed, I do not believe that it is possible to assess intelligences in pure form . . . I discourage efforts to characterize individuals or groups as exhibiting one or another profile of intelligences. While at any moment a person or a group might exhibit certain intelligences, this picture is fluid and changing. Indeed, the very lack of a developed intelligence of one sort can serve as a motivation for the development of that intelligence . . . (intelligences) are subject to being considerably modified by changes in available resources and for that matter, in one's perceptions of one's own abilities and potentials. (xxii)

Gardner is especially concerned that educators not use MI to label individuals. "The intelligences are categories that help us to discover differences in forms of mental representation; they are not good characterizations of what people are (or are not) like . . . try to use that knowledge to personalize instruction and assessment . . . MI cannot be an educational end in itself. MI is rather a powerful tool that can help us to achieve educational ends more effectively. . . . The more we can match youngsters to congenial approaches to teaching, learning, and assessing, the more likely it is that those youngsters will achieve educational success" (Durie 1997, 1-2).

The MI approach based on personalized education and assessment has tremendous potential to reform current practices. Specific consideration to remediation and higher education is discussed in the next section in order to address the prospect of applying MI to this at-risk population.

Remediation in Higher Education

"The Nation's dissatisfaction with higher education has manifested itself over the past decade in various preoccupations. In recent months, remedial education has become the latest such fixation. Governors, mayors, legislators, and educators have lined up to decry the cost and erosion of high-quality higher education as the result of the admission of students who are unable to do college-level work" (Breneman and Haarlow 1999, B6).

Remediation is the number one problem with higher education today, claimed the 1999 study by the Public Agenda for the National Center for Public Policy and Higher Education. The survey results showed that 88 percent of business leaders and 86 percent of professors, administrators, and government officials believed students are underprepared for college (Wright 1999).

Some have estimated that postsecondary remediation today is costing roughly $1 billion annually, less than 1 percent of the $115 billion spent on higher education (Breneman and Haarlow 1999). Another study by the Institute for Higher Education Policy stated the remediation price tag has increased to $2

billion (Potter 1998). Cost is not the only reason that remediation is commanding attention in higher education.

Certainly, the indirect costs of remediation cannot be discounted. Critics of remediation claim that high school students are less motivated knowing they can gain admission to many two- and four-year colleges without mastering basics. These students detract from the education of fully prepared students. The results are cheapened degrees, dumbed-down courses, falling graduation rates, and pressure on faculty to demand less of students.

This rhetoric fails to consider the full implications and need for remediation as a benefit to society and to individuals seeking to succeed in life (Breneman and Haarlow 1999). Although cost containment is a legitimate concern, the need for citizens and a workforce with solid basic skills of reading, writing, and mathematics is also very apparent. As the labor market changes, these fundamental skills are essential and becoming increasingly important for success as a *knowledge worker* in the information age (McMillan, Parke, and Lanning 1997).

Although not a new phenomenon, the need for remediation grew out of the mass higher education movement following World War II. This dramatic explosion in enrollment fueled by the GI Bill continued to grow with the open admission policies of the 1960s. It was this increased college enrollment that also spurred the admissions testing movement (Hoff 1999).

In turn, the testing mania has led to the current accountability movement with the increased demand to document student outcomes and calls for greater efficiency and productivity). Although the National Center for Education Statistics (NCES) published studies in 1983, 1989, and 1995, there are limited data on remediation trends and considerable disagreement about the problem (McMillan, Parke, and Lanning 1997).

An Institute for Higher Education study stated that a constant 6 percent of students have taken remedial courses from 1989 to 1995 (Potter 1998). According to the fall 1995 NCES study, 29 percent of freshman at public and private two- and four-year institutions took at least one remedial course. The figure was 41 percent for public community colleges. In addition, 24 percent of remedial courses are taken by sophomores, and 9 percent by both juniors and seniors. The startling fact is that the total number of remedial students is greater and expected to grow as college enrollment increases (Ignash 1997).

As more data are collected, there is increasing concern that there is indeed, an elephant in the room (Potter 1997). For example, the California State University system reported in fall 1998, that more than half of the entering freshman needed remedial math work and nearly half were behind in English (Bazar 1999). In recent years, the roster of four-year colleges attempting to limit remediation has grown to include institutions in Arkansas, California, Florida, Illinois, Louisiana, Montana, Nebraska, Nevada, New Jersey, New York, Oklahoma, Tennessee, and Virginia.

Clifford Adelman of the U.S. Department of Education reported that students who took the greater number of remedial courses had lower rates of bachelor's degree completion. Students requiring reading remediation were more likely to fail than those who needed refresher math and writing courses (Jones 1998).

New studies are also showing that it is not only eighteen-year-old high school graduates who are in need of remediation. The Institute for Higher Education study found that 46 percent of the freshman taking remediation were over twenty-two-years old and that 27 percent were over thirty. Many of these were older adults seeking workplace skills as well as immigrants who need English as a second language (Potter 1998b). Neglecting the needy remedial population, whatever their age or background, presents a moral dilemma especially in a democratic society that advocates mass education.

The more practical dilemma of where remedial education should be conducted has been the core of recent debates. Nationally, 80 percent of all public colleges and 63 percent of all private colleges offer remedial courses. NCES stated that all community colleges offered remedial courses, with most viewing it as a core part of their mission. Four-year colleges are typically less forthright about remediation, and likely underreport the amount and costs of their remedial programs (Romer 1999; Ignash 1997).

Limiting remedial education to community colleges with strong transfer programs would continue to make higher education widely available and provide

incentive for high school students who want to go directly to four-year institutions. An unfortunate byproduct of this approach would be to reduce the number of underrepresented students enrolled in universities. Another option is providing remediation through specialized private profit-making organizations such as Kaplan Educational Centers and Sylvan Learning Systems (Breneman and Haarlow 1999).

"Access to higher education made possible by remediation is so important to the lives of those it aids, however, that we urge policy makers to approach the search for local answers with a regard for evidence and an absence of ideological certitude" (Breneman and Haarlow 1999, B7). The president of the Institute for Higher Education Policy concluded that: "One of our concerns with the debate about college remediation . . . is that there really hasn't been a whole lot of factual discussion about what remediation is, how it works" (Potter 1998b, 3). When the controversial dust settles, the remedial debate must focus on this critical issue.

The real question is not if and where remedial education for adults should occur. The more important distinction is the philosophy of remedial or developmental programs. The limited view is to provide "remedies for specific deficiencies in reading, writing, and math . . . (while) developmental programs focus on the whole learner with the unique blend of academic and personal strengths and weaknesses that each individual brings to the learning process" (Ignash 1997).

McMillan, Parke, and Lanning (1997) stated that the philosophical base of remedial/developmental programs has been influenced by three major schools of learning theory. Behaviorist theories using self-paced computer-assisted instruction and open-entry open-exit format are nonintrusive and inexpensive. Developmental theories enable learners to move from one level of knowledge to another in a supportive encouraging environment. A third approach is a blend and features the instructor as a facilitator of self-directed learning. The most commonly used developmental program is often combined with self-paced modules for cost-efficiency. Adult learners appear to benefit more from a self-directed approach.

"Clearly, students exhibit a range of needs in the area of remedial/ developmental instruction for which there is no one-size-fits-all solution" (McMillan, Parke, and Lanning 1997, 30). A number of educators do agree that "Research regarding the characteristics and learning styles of students as well as documented patterns of academic performance for various groups of students may be helpful" (31). "Educators need to first inform themselves about the particular characteristics of students who need remedial/developmental education at their institutions and then develop effective programs to address these needs for remediation based on these characteristics" (Ignash 1997, 16).

With the increasing postsecondary remedial population, the need for research has become more apparent. More data are critical if educators are to

develop strategies that improve success rates for this growing at-risk cohort of students.

Application of MI to Remediation in Higher Education

Cognitive research has found that many early representations are extremely powerful and therefore difficult to change. The college student despite exposure to theoretical knowledge will often revert to the uninformed opinion of the unschooled mind of a five-year old (Gardner 1991). It is necessary to identify early representations and confront these assumptions repeatedly and directly in a robust and expansive format in order to educate for genuine understanding (Veenema and Gardner 1996).

MI can be a useful tool "to teach for understanding, to prepare individuals for beyond school, to develop each person's potential fully, and to make sure that students master core knowledge" (Gardner 1997b, 20). "An MI approach means that curriculum and instruction are designed based on students' needs, offering a variety of pathways to learning and understanding" (Hoerr 1996b, 18-19).

"By emphasizing students' abilities rather than disabilities, Gardner validates such accomplishments as significant products of right brain function, which are seldom evaluated in standardized tests" (Jordan 1996, 30). California educator and MI advocate, Thomas Armstrong (1994) defined remediation philosophy and practice of most school systems as focusing on a *deficit*

paradigm; he recommended consideration of a *growth paradigm* where labeling is abandoned. Instead of defining deficits, assessed needs should focus on strengths (Jordan 1996). Remediation is replaced by "a varied set of interactions with real-life activities and events" (135).

Experiments with nontraditional methodologies are emerging. "Although Gardner has begun to break into the mainstream of educational thinking, it is still hard to persuade the conservative, middle-class teaching profession to do things radically differently from the ways in which they themselves were taught in school" (Smagorinsky 1996). Any prospect of change will require modification of traditional *mental models* of intelligence and teaching (Bolanos 1996, 24).

Advocates of MI's approach to education support a total learning community as espoused in Peter Senge's (1994) The Fifth Discipline. Although Senge's ideas were directed to business organizations, educators find his concepts adaptable to education. Personal mastery and visioning are critical activities for teachers and students. Prior mental models must be relinquished and new collaborative designs embraced. "Systems thinking is a continuous dynamic of persons, environments, challenges, and opportunities centered in the living organism of the school" (Bolanos 1994, 245).

Most exploration of authentic assessment and MI teaching in education has been conducted at primary and secondary levels (Latham 1997). Interesting examples, however, were also found in the business world where employee

training programs are being designed that combine whole-brain learning and MI theories.

> (This) approach views learners as diverse, highly individual, whole persons who learn best when their senses and emotions, their many kinds of intelligences, and their very diversity are all actively involved in the process of learning. This provides us with the best opportunity to tap into their own learning styles so that they not only learn and retain the information better, but also learn how to learn better. (Visser 1996, 39)

The fact remains that "our education system is now faced with an admittedly diverse set of students who possess a wide range of expressive abilities. One answer that is emerging from the cognitive analysis of intellectual abilities is that tests are better used for diagnostic purposes [i.e., as assessments of current functioning so as to inform instructional needs] rather than for classification. Thus, several researchers propose the development of new assessment tools designed for a new purpose (Gardner and Hatch 1990; Yekovich 1994).

"Fine-grained cognitive analysis can be used beneficially to uncover individual differences in the information processing profiles of students. A clear and important implication of this work is that such analyses will eventually lead to dramatic improvement in our ability to assess an individual's current level of intellectual functioning and to prescribe instructional interventions that will maximize each individual's potential" (Yekovich 1994, 3).

That MI can provide critical insights into improved assessment and instructional methodology is a distinct possibility. Gardner is certain that new

information about the brain and genetics will accelerate developments and continue to change our understanding of intelligence. Given that brain researchers believe that humans use less than 1 percent of the brain's potential, there is tremendous unrealized capacity (Lazear 1992, 8).

Gardner (1994a; 1994b; 1995b; 1997b) has admitted that his views have modified since he first set forth MI theory with the goal of contributing to developmental psychology and the behavioral and cognitive sciences. Because of the considerable influence of MI on educators, he began responding to both critics and practitioners (Checkley 1987).

Nonetheless, MI has benefited from the fruitful interplay between practitioners and researchers. Gardner (1997b) has stated that further developments require regular interaction between these two communities. The promise for education reform hinges on the cross-fertilization of the many discipline-specific scholars exploring intelligence and learning.

The concentration of MI studies at Harvard University and at most other places has been primarily with K-12 students. Many of these efforts involved assessment activities that focus on alternative or authentic methodologies. Gardner did not develop an MI instrument, but has assisted other researchers as an expert reviewer in developing assessments to measure multifacted intelligence (Project Zero homepage 1998). A discussion of various MI instruments is provided in the next section as well as the rationale for the particular instrument chosen for this study.

MI Assessment Instruments

Research uncovered the following six MI instruments:

1. Project Read: Multiple Intelligences for Adult Literacy and Adult Education Assessment by Dr. Leslie Shelton (1996)

2. Teele Inventory for Multiple Intelligences (TIMI) by Dr. Sue Teele (1997b)

3. Where Does Your Intelligence Lie? by The Teachers' Curriculum Institute (Bower, Lobdell, and Swenson 1999)

4. An MI Inventory for Adults by Thomas Armstrong (1994)

5. The Rogers Indicator of Multiple Intelligences by Dr. J. Keith Rogers (Corey and Corey 1997)

6. The Multiple Intelligence Developmental Assessment Scales (MIDAS) by Dr. C. Branton Shearer (1998).

Dr. Leslie Shelton's (1996) Project Read: Multiple Intelligences for Adult Literacy and Adult Education Assessment uses a highly individualized approach. The format includes open-ended discussion with the student that approximates a one-on-one counseling situation. This strategy did not seem appropriate for the purpose and setting of this descriptive study.

The second instrument developed by Dr. Sue Teele (1997b) was also considered. Her dissertation and current work through the University of California, Riverside, is credited with significant contributions to MI studies. Developed with Gardner's assistance, the TIMI instrument is pictorially-based

with panda bear images and claims to be usable for all ages. The majority of studies using her instrument have been conducted with K-12 students. The researcher determined that this instrument would yield limited information for a community college study. There was additional concern that remedial community college students might perceive the panda images as infantile.

The Teachers' Curriculum Institute questionnaire, Where Does Your Intelligence Lie? has thirty-five items with options for three responses of true, false, and blank (for sometimes). According to the directions, the distribution of responses results "may help you to identify your areas of strongest intelligence" (Bower, Lobdell, and Swenson 1999, 13). This instrument would also yield limited data for a community college study.

The MI Inventory by Thomas Armstrong (1994) includes ten statements for each intelligence category. Armstrong has stated that: "This inventory is not a test, and that quantitative information [such as the number of checks for each intelligence] has no bearing on determining your intelligence or lack of intelligence" (17). The purpose is to appraise individual performance and connect life experiences with the intelligences. The absence of quantifiable data in this instrument would make collation of any meaningful data difficult.

The Rogers Indicator of Multiple Intelligences (RIMI) is a self-inventory to pinpoint dominant intelligences. There are forty-nine questions (seven questions for seven domains) to be ranked on a Likert scale, and a method of summarizing the results to determine strengths and weaknesses. A description of how to

interpret the scores is also provided. The RIMI is provided as an exercise in the textbook, I Never Knew I Had A Choice that is used in remedial general studies courses (Corey and Corey 1997). Despite this attractive feature, it would yield limited disaggregated data for a comprehensive study.

The Multiple Intelligence Developmental Assessment Scales (MIDAS) (1998) by Dr. C. Branton Shearer at Kent State University was chosen for this study. Research for the instrument began as part of his dissertation at Union Institute (1992), and is based on MI theory as described in Gardner's (1993a) seminal work, Frames of Mind. Gardner served as a resource expert during the developmental stages and has stated that "the MIDAS represents the first effort to measure the multiple intelligences, which have been developed according to standard psychometric procedures" (Shearer 1998, n.p.).

The MIDAS questionnaire (appendix A) is a 119-item self-report that describes a person's intellectual disposition in the eight MI domains as well as in twenty-six specific task areas. Additional consideration of selected responses provides further information about higher level cognitive abilities. "The questions inquire about activities of everyday life that require cognitive ability, involvement, and judgement" (Shearer 1996a, 3). Some items explore an individual's ability or enthusiasm for a specified activity, others ask respondents to specify frequency on an activity. Each item uses a five-point Likert scale with a range of responses. A zero category is included for every item if the respondent does not

know or remember, or feels it does not apply to him/her. These zero responses are not figured into the scale scores.

The MIDAS was selected because it generates a breadth and depth of information not evident in the other instruments reviewed by the researcher. In particular, the MIDAS goes beyond classification of dominant domains to include specific skills and intellectual style subscales. In addition, the MIDAS was the only instrument that was revised to include the Naturalist intelligence, the newest addition by Gardner to MI theory (Gardner 1996a).

The larger scope of data available from the MIDAS instrument offers the student/teacher as well as the researcher more useful information. The next section describes the scoring processes, administration issues, and the standard data derived from the MIDAS.

Interpreting the MIDAS Instrument

The raw data from completed MIDAS questionnaires must be entered into a scoring program in order to produce individual profiles. There are two ways to complete the computerized scoring and obtain an individual MIDAS profile: (1) a DOS-based GWBASIC scoring program is available, or (2) completed Scantron forms can be submitted to the publisher for processing. The researcher selected to enter the data into the GWBASIC program in order to have access to all raw data for statistical manipulation.

After the data from a completed questionnaire were entered, the scoring program generated individual profiles. Each profile had three pages of summary data (see appendix B for sample). All pages were personalized with the individual's name. The top of the first page identified the person by gender, age, ethnicity, and individual and group codes. The remainder of the first page presented the percentage scores for the main scales and research scales in histogram form. On the second page, the specific skill subscales with their main scale designation were rank ordered from high to low scores. The third page listed all main scales and their specific skill subscale scores with percentage scores and corresponding designation of low, moderate, or high ranking (Shearer 1996a).

Shearer (1997b; 1997c) provides detailed instructions for administration of the instrument as well as handbooks for students and teachers about interpretation of a profile. "Brief Learning Summary" worksheets (see appendix C) were available so individuals could reflect on the results of their profile. Shearer cautioned that "test scores leave powerful impressions and need to be communicated in a responsible and reasonable manner" (Shearer 1996a, 12).

Consequently, care was taken to administer the instrument in college success classes that included related instructional strategies where instructors could use the results to enhance the learning experience. Although each instructor used the profiles differently, a blank Brief Learning Summary worksheet was included with each profile, thereby providing the opportunity for

related follow-up activities. For this study, the researcher compiled all data from completed questionnaires to generate a group profile. Additional statistical manipulations were considered to determine if and where differences existed.

Summary

This chapter reviewed the literature in regard to the derivation and definition of Howard Gardner's Multiple Intelligence Theory, which is based on the premise that individuals possess numerous mental representations and intelligences.

> Individuals also differ from one another in the forms of these representations, their relative strengths, and the ways in which (and the ease with which) these representations can be changed. There are at least eight discrete intelligences and these intelligences constitute the ways in which individuals take in information, retain and manipulate that information, and demonstrate their understandings (and misunderstandings) to themselves and others. (Veenema and Gardner 1996, 70)

According to MI, "each person has a unique cognitive profile" (Campbell 1997, 15) that defines strengths and weaknesses (Gardner 1993a). "If one knows one's own strengths and weaknesses, the chances of succeeding in school or in life are improved" (Hoerr 1996b, 16).

A review of assessment practices highlighted the current limitation of honoring those with linguistic and logical-mathematical abilities as demonstrated on standard intelligence tests. "Assessment is an integral part of the learning process and must be part of the reform effort. . . . By integrating multiple

intelligences into the assessment process, students can be assessed" more accurately (Teele 1996, 69).

Teachers must examine how they assess student learning in order to ensure that such assessment includes all of the intelligences (Hoerr 1996b). If individuals have unique combinations of intelligences, then "it makes little sense to treat everyone in a one-size-fits all manner" (Veenema and Gardner 1996, 71). Accurate assessment of abilities is key to personalized learning.

The status of remediation in higher education can be summarized as follows: "The dissatisfaction with developmental education continues to spread across the country" (Evelyn 1999, 8). All community colleges and 63 percent of four-year colleges now offer remedial courses. With some four-year institutions reducing or limiting remediation, community colleges' role in the remedial education issue will intensify. New approaches are needed to address this problem and help this at-risk population succeed.

Because of its pluralistic and pragmatic focus (Hoerr 1996b), using MI for assessment and new instructional approaches offer a powerful vehicle for remediation reform. "MI theory is a paradigm shift because it changes the way we look at students and their potentials . . . each school's implementation of MI will be culture-specific, context-specific, and school-specific . . . something that is best done by faculty members working together as colleagues creating strategies for their unique teaching situation" (Hoerr 1996c, 9-10).

Research into various MI instruments yielded several alternatives. The MIDAS developed by Dr. C. Branton Shearer (1998) was selected because of its comprehensive nature and ability to provide qualitative as well as quantitative data. A brief discussion of how to interpret the MIDAS was also included.

Because true reform occurs in the classroom, this study was conducted to assess remedial community college students in a classroom setting using a validated MI instrument. Information on MI profiles of remedial students will contribute to the understanding of students' learning potential. This foundation is key to the development of instructional methodologies to maximize their success.

Chapter III presents a methodology for MI assessment of a remedial community college cohort. This includes the research type and design, sample and population, data collection and limitations of the study.

CHAPTER III

METHODOLOGY

Introduction

All men by nature desire to know.

Aristotle

This chapter describes the methodology of the study. This includes the purpose statement, the research type and design, a description of the setting, sample and population, the instrument reliability and validity, the data collection procedures, and the limitations of the study.

Purpose of the Study

The purpose of this study was to identify, according to the MIDAS instrument, the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. A second purpose was to determine whether statistically significant differences existed among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity. A third purpose was to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains.

Research Questions

1. What are the dominant MI domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

   a) Musical

   b) Kinesthetic

   c) Mathematical

   d) Spatial

   e) Linguistic

   f) Interpersonal

   g) Intrapersonal

   h) Naturalist

2. What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

3. What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

4. Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

Research Type and Design

The research types and design used in this study were descriptive and ex post facto. Using these two types of research for this study provided a means to describe what was found and also to consider differences between groups.

"A high percentage of reported research studies are descriptive, no doubt because it is useful for investigating a variety of educational problems" (Gay 1996, 249). According to Isaac and Michael (1997), a descriptive study seeks "to describe systematically a situation or an area of interest factually and accurately" (46). By reporting "the way things are, the descriptive researcher has no control over what is and can only measure what already exists" (Gay 1996, 250).

Ex post facto research "is sometimes treated as a type of descriptive research since it too describes conditions that already exist . . . however, (it) also attempts to determine reasons, or causes for the current status of the phenomena under study" (Gay 1996, 321). This type of research goes beyond describing what exists to consider the cause for differences that existed between different groups.

Gay (1996) cautions that descriptive research sounds simple, nonetheless "samples must be carefully selected and appropriate relationships and conclusions derived from the data" (250). Sample selection is particularly critical because it is not always apparent what population has the desired information.

Because there is currently much interest in Multiple Intelligences (MI) as well as tremendous growth in MI publications and practitioners/advocates, initial consideration was given to where research had not yet been conducted. Numerous projects and dissertation studies have examined students at the primary and secondary educational levels. Very little work has been done with postsecondary students and nothing was found related to the growing population of remedial community college students. The following section describes the selected setting and its relevance for this study.

Setting

According to the American Association of Community Colleges (AACC), the national community college enrollment is 5.7 million (for credit) students (Estrin 1998). The California Community College (1998) (CCC) system is the largest higher education system in the world with nearly one in every sixteen adults in California enrolled. Approximately 1.25 million students take credit courses (1.4 million including noncredit) each semester. These figures indicate that California is educating 22 percent of community college students enrolled in credit earning courses nationally. Thus, dominant characteristics in California Community Colleges are likely to reflect national attributes as well.

There are 71 districts with 107 colleges in the California Community College system. Redwoods District covering over 5,900 square miles is geographically one of the largest community colleges in the state. It serves a tri-

county region larger than Rhode Island and Connecticut, but is sparsely populated with only 237,040. The fall 1997 Redwoods District enrollment was 7,054 with approximately 5,000 at the Eureka campus. College of the Redwoods is below the state average credit enrollment of 11,682 per college. However, it exceeds the national figure of 3,500 average enrollment (Phillippe 1997).

The demographics of the Redwoods District when compared to national and California community college statistics indicated many similarities that substantiate drawing a sample population for this study from the Redwoods District. Key indicators that were reviewed included gender, age distribution, ethnicity, unit load, and enrollment status. Remediation trends were also examined to define the current situation and characteristics of this growing population in higher education and community colleges in particular.

The national, state, and local statistics on gender distribution for community college students in the CCC, Redwoods District, and U.S. are extremely similar as shown in table 1.

In age distribution, there is considerable similarity between the CCC and the Redwoods District as seen in the table 2. The student average age at Redwoods is 29.6 years old, and is comparable to the national community college student average age of 29 years old (Estrin 1998; Phillippe 1997).

Key differences appear in comparing the ethnic distribution on the state and local level as seen in table 3. Redwoods District has higher concentrations

TABLE 1

COMPARISON OF COMMUNITY COLLEGE STUDENT POPULATIONS
BY GENDER (CCC, REDWOODS DISTRICT, AND U.S.)

	CCC*		Redwoods*		
Gender	Total Enrollment	Percentage	Total Enrollment	Percentage	U.S.** Percentage
Female	82,115	57	4,118	58.5	58
Male	619,273	43	2,922	41.5	42
Unknown	3,947		14		

Source: *CCC (1998, n.p.); **Estrin (1998, 13); and Phillippe (1997, 26).

TABLE 2

COMPARISON OF COMMUNITY COLLEGE STUDENT POPULATIONS
BY AGE (CCC AND REDWOODS DISTRICT)

	CCC*		Redwoods*	
Age Groups	Total Enrollment	Percentage	Total Enrollment	Percentage
19 or less	286,952	19.9	1,549	22.0
20-24	363,359	25.1	1,939	27.5
25-29	198,112	13.7	869	12.3
30-34	142,365	9.8	564	8.0
35-39	119,723	8.3	531	7.5
40-49	168,312	11.6	902	12.8
50+	162,930	11.3	695	9.9
Unknown	3,582	0.2	5	0.1
All ages	1,445,335	100	7,054	100

Source: *CCC (1998, n.p.).

TABLE 3

COMPARISON OF POPULATIONS BY ETHNIC DISTRIBUTION
(CCC AND REDWOODS DISTRICT)

	CCC*		Redwoods*	
Ethnic Distribution	Total Enrollment	Percentage	Total Enrollment	Percentage
Asian/Pacific Isle	183,419	12.7	183	2.6
Black	109,226	7.6	94	1.3
Filipino/Hispanic	396,484	27.4	501	7.1
American Indian	15,870	1.1	427	6.1
White	641,565	44.4	5,616	79.6
Other/Unknown	98,771	6.8	233	3.3

Source: *CCC (1998, n.p.).

of American Indian and White enrollments and distinctly lower enrollments of Asian, Filipino, Hispanic, and Black individuals than the CCC system as a whole.

The ethnic composition in the CCC system is dissimilar from the composition of the general population in the state, which includes 54 percent White and 28 percent Hispanic. There is also considerable variance in California's ethnic distribution compared to the national statistics as seen in table 4. The Redwoods District enrollment better approximated the national in all categories except the lower proportion of Black and higher percentage of American Indians. Table 5 shows a similarity in enrollment status between CCC and Redwoods with a slightly higher percentage of first-time and returning students at Redwoods.

TABLE 4

COMPARISON OF ETHNIC POPULATIONS
(U.S. AND CALIFORNIA)

Ethnicity	U.S.* Percentage	California** Percentage
Asian/Pacific Isle	3	10
Black	12.3	7
Hispanic	9	28
American Indian	.8	1
White	75.7	54

Sources: *Day (1999, 9); **Malson (1998, 7).

TABLE 5

COMPARISON OF FALL 1997 ENROLLMENT STATUS
(CCC AND REDWOODS DISTRICT)

Enrollment Status	CCC* Percentage	Redwoods* Percentage
First-time student	18.4	23
First-time transfer	10.5	9
Returning transfer	2.8	1.3
Returning student	12.3	15.3
Continuing student	49.7	48.9
Unknown	3.6	
Not applicable	2.7	2.5

Source: *CCC (1998, n.p.).

Another characteristic of unit load was analyzed and is shown in table 6. The Redwoods District has significantly less students enrolled on a noncredit basis and significantly more students enrolled full time (i.e., twelve or more credits than the CCC system). In this regard, Redwoods' statistics (38.6 percent part-time and 61.4 percent full-time students) were closer to the national community college profile that showed 36 percent of students enrolled full time and 64 percent part time (AACC 1998).

TABLE 6

COMPARISON OF STUDENT UNIT LOAD IN FALL 1997
(CCC AND REDWOODS DISTRICT)

	CCC*		Redwoods*	
Student Unit Load	Total Enrollment	Percentage	Total Enrollment	Percentage
Non-Credit	199,624	13.8	98	1.4
0.1 - 2.9	161,145	11.1	690	9.8
3.0 – 5.9	350,506	24.3	1,649	23.4
6.0 – 8.9	219,127	15.2	1,043	14.8
9.0 – 11.9	161,561	11.2	854	12
12.0 – 14.9	243,785	16.9	2,037	28.9
15 +	113,280	7.8	683	9.7
Unknown	- 3,693	0.3		

Source: *CCC (1998, n.p.)

This comparative review of student profiles on a state and national level indicated that the Redwoods District was sufficiently viable as a sample population to conduct this study. Further analysis of the study participants would provide specific information about generalizing results to a broader population.

Besides general demographic comparisons, information about remediation at community colleges was examined. Ignash (1997) stated that the percentage of college freshman in precollegiate programs diminished in the last one hundred years from 40 percent of 238,000 in 1894 compared to 13 percent of 14 million in 1994. The absolute number of students requiring remediation is approaching a staggering two million. This is, and will continue to be, a growing concern not only for educators, students, and legislators, but for the general public as well.

The fall 1995 National Center for Education Statistics (NCES) study reported that 41 percent of first-time freshman at public community colleges took at least one remedial reading, writing, or mathematics course. This is compared to 22 percent for public four-year colleges and universities and 29 percent for public and private two- and four-year institutions. Thirty percent of all English courses and 16 percent of math courses (excluding self-paced, individualized, or lab courses) in two-year institutions were remedial (Ignash 1997).

Another NCES study indicated that the remedial population is bipolar in age. Less than one-third of entering freshman, ages 19 and under, required remediation while almost half (45.3 percent) were over 22 years old, the

traditional age of baccalaureate degree graduation. After ages 19 and 20, the largest percentage of remedial students were in the 25 to 29 year-old age group, followed by similar percentages for the age 20 and the 30 to 34 year-old age groups. This increase in the older nontraditional student suggests some serious consequences for the current educational system (Ignash 1997).

Ethnicity is another important defining characteristic of the remedial population. According to the 1995 NCES study, Hispanic and Asian/Pacific Islander students took more remedial reading and writing courses while Black and White students are enrolled in more remedial math courses. Although more current data than 1992-1993 and disaggregated data specifically for community college students are not available, it is apparent that minority students take more remedial courses. This has serious implications for their persistence and completion rates in higher education. Lastly, the extent and type of remedial instruction is an important factor in defining this population. "There is a difference in the persistence and success rates of students who need one remedial course in math or English compared to students who need three or four remedial courses" (Ignash 1997, 12).

Developing successful remediation programs must be based on an understanding of the characteristics and learning styles of remedial students (Ignash 1997; McMillan, Parke, and Lanning 1997). Institutions should examine the age distribution, the sex, and ethnicity as well as other factors such as ESL, dropout, and GED completion rates. Defining the remedial student is critical to

target resources and improve results. Investigating different methodologies and teaching strategies for different age groups is important, as is tracking the persistence and achievement of remedial students by race and ethnicity.

The scope of the remedial problem has been described as "the education world's equivalent of the elephant-in-the-living-room syndrome: An enormous problem staring you in the face that everyone can see but no one likes to talk about" (Potter 1997, 11). Given the dearth of remedial and MI research in higher education, this study would yield useful preliminary data to enhance current understanding about the demographics as well as MI tendencies of remedial community college students.

Population and Sample

The Redwoods District has three campuses and two centers located in the California North Coast region. The largest campus in Eureka with approximately 5,000 students was selected for this study. Of the 5,000 enrollees, about 2,200 individuals completed the required entrance assessment instruments. Cumulative data for 1995-1997 show cut scores that place 49 percent of entering freshman at remedial mathematics and English levels (Redwoods District Assessment Office Statistics 1998). The Redwoods remedial population is higher than the 41 percent reported nationally for first-time community college freshman (Ignash 1997; Yamasaki 1998; and Phillippe 1997).

A decision to pursue information in a specific remedial cohort focused on the largest population of credit level remedial general studies students. Preliminary discussions with college leaders resulted in interest and support for this research study from the Vice President of Academic Affairs, the Vice President of Student Services, and the Dean of Humanities. Support from the faculty member in charge of the College Skills course was also solicited.

For the spring 1999 term, nine sections of the General Studies 100 College Skills course were originally scheduled. When the co-requisite requirement for this course with remedial English was dropped, five sections were canceled. With typical enrollments of twenty individuals, the remaining four classes still provided a sufficient population of students for this study. Actual enrollments for spring 1999 term resulted in eighty-one study participants.

In addition, the General Studies 100 College Skills curriculum focusing on student success strategies seemed an ideal situation for a MI study. The administration of a questionnaire as part of the regular class activity would provide a natural environment to collect data. Since many remedial students show strong antitesting propensities, a forced situation could skew responses.

During fall 1998, the College Skills instructors were invited to participate in the study on a voluntary basis. The instructors met with the researcher to discuss implementation of the study for the spring 1999 term (see appendix D memoranda). In order to introduce the concept of the study, each instructor completed the MIDAS instrument. Their individual MIDAS profiles and a

summary profile were developed from the results. These demonstrated the kind of data that would be generated. This enabled the instructors to consider the appropriate timing for administration of the instrument as well as strategies for inclusion in the curriculum.

This study focused on collecting data to describe the dominant domains, specific tasks, and predominant intellectual styles of the participating remedial community college students. Data were also collected from all instructors and interns in the originally scheduled nine sections. Individual instructors decided how to use the results in the instructional process during spring 1999.

Instrument Reliability and Validation

As described in chapter II, the researcher reviewed MI instruments to determine the most appropriate one for this study. The Multiple Intelligence Developmental Assessment Scales (MIDAS) by Dr. C. Branton Shearer at Kent State University was chosen for this study (see appendix A). The MIDAS was selected because of its strong correlation to MI theory as described by Howard Gardner in his seminal work, Frames of Mind (1993a). Also, Gardner served as a resource expert during the developmental stages and stated that "the MIDAS represents the first effort to measure the multiple intelligences, which have been developed according to standard psychometric procedures" (Shearer 1998, n.p.).

In addition, the MIDAS was the only instrument that was revised to include the Naturalist intelligence, the newest addition by Gardner to MI theory (Gardner

1996a). The MIDAS was selected because it generates a breadth and depth of information not evident in the other reviewed instruments. In particular, the MIDAS goes beyond classification of dominant domains to include specific skills and intellectual styles subscales. This larger scope of data offered the student and teacher as well as the researcher more meaningful information.

The MIDAS for adults and adolescents was first developed in 1987 through a rational-empirical approach based upon Howard Gardner's MI theory as described in Frames of Mind (Shearer 1997a). Three phases of research focused on the developmental stages of construction, scale composition, and subscale creation for the MIDAS instrument. Shearer (1996a) summarized these phases to establish reliability and validity as follows:

> Phase 1 primarily involved a factor analysis with 349 participants. Phase 2 was a field-testing of the questionnaire involving in-depth interviews with a small sample of adult volunteers with less than a high school education. The focus of Phase 3 examined inter-rater reliability by comparing the agreement rates between 3 different raters and subscale development was also undertaken. (58)

Phase 1: Item Construction and Factor Analysis

The initial 121-item instrument was drawn from descriptive characteristics of MI theory and identified critical incidents or behaviors in order to ascertain specific skills. Observable activity was emphasized through three types of questions that asked the respondent:

1. To assess the frequency or duration of an activity
2. To evaluate performance as recognized by others

3. To define their enthusiasm for a particular activity

A pretest on eleven hospital employees resulted in reduction of items before administration to 349 hospital employees and university psychology students. The equal number of male and female respondents (mean age of 32, 40 percent college graduates) reported on someone close to them. Evaluation for internal consistency resulted in elimination of items. Preliminary factor analysis also deleted items that were developmental in nature (i.e., related to childhood) and identified items that required co-loading (Shearer 1996a).

Phase 2: Scale Development, Field-Testing, and Expert Review

The second study added items to fill in content areas, refine wording, and improve readability and clarity. Adults from a vocational counseling program and relatives of hospital patients completed the questionnaire through an interview process. The revised instrument underwent expert content review, subscale analysis, cultural and gender bias, and refinement to a sixth-grade reading level. Also, a computerized system of scoring was designed based on factor loading (Shearer 1996a).

Phase 3: Scale Evaluation and Subscale Development

The primary focus was interrater reliability and the addition of the Innovation and General Logic research scales. Work with an expert reviewer and statistical cluster analysis produced a high 75-80 percent rate of agreement.

Discrepancy analysis sharpened wording and aided in final subscale configurations. Subscales were established with two-to-eight items and provided descriptive information about abilities in a specific domain (Shearer 1996a).

Psychometric Properties of the MIDAS

Although the MIDAS is a self-reporting instrument, Shearer (1996a) decided "to assess its reliability and validity against standards used to evaluate objective tests" (62). Over a period of six years, the relationship of a MIDAS profile to reality was tested through four studies: Study 1 included 349 hospital employees and college students; Study 2 included 212 sets of ratings for seventy-four adult volunteers, family members and hospital clients; Study 3 included fifty-six people from adult education classes, a sheltered workshop and master's level counselors; Study 4 included 224 college students from thirteen different classes and their instructors.

Reliability

The internal consistency of the items within each scale was proven with a grand mean of 0.85 for the dominant domain scales and 0.83 for the research scales. The Kinesthetic scale was the only one below 0.80, but this was likely due to the distinctions between large and fine motor and expressive movements.

Temporal reliability showed test-retest results with a week separation and a second study eight-to-ten weeks apart. The correlation average of 0.81 indicated adequate stability. Interrater reliability efforts in the first phase resulted

in elimination of items with less than 65 percent agreement. The more comprehensive second study of 212 responses for 74 subjects found 75-85 percent agreement. Scales scores were categorized as Very High, High, Moderate, Low, and Very Low based on mean scores and standard deviation (Shearer 1996a).

Validity

Validity was examined during six studies that focused on content, construct, concurrent, and predictive validity as well as contrasted criterion groups. The research questions to distinguish distinct intelligence scales required numerous revisions after the initial factor analysis. During the inter-rater reliability study, discriminant and convergent validity were investigated via a multi/trait - multi/method matrix. Content and cluster analyses as well as contrasted groups provided further evidence for construct validity. Expert reviewers (including Howard Gardner) were vital to content as well as scale composition (Shearer 1996a).

Comparing MIDAS scores to a battery of tests of the same or related abilities were conducted for concurrent validity. "Overall, the pattern of correlations was moderate and in the expected directions with appropriate tests" (Shearer 1997a).

Predictive validity was addressed through a study of college students' self-report in comparison to their instructors. Instructors tended to rate students'

abilities one category higher indicating that further research is needed in this area. Contrasted groups analysis indicated that the mean scores and their patterns are logically consistent with those expected of college students.

In summary, the MIDAS has adequate reliability and sufficient construct and criterion validity to provide *a reasonable estimate* of a person's intellectual disposition. A detailed description of the development studies and the statistical results are provided in Shearer's (1996a) publication, The MIDAS: A Guide to Assessment and Education for the Multiple Intelligences.

Data Collection and Tabulation Procedures

The General Studies 100 College Skills instructors, who voluntarily decided to participate in the study, met with the researcher during the fall 1998 term to plan the administration of the instrument during a regular instructional period in the spring 1999 term (see appendix D). It was determined that the MIDAS instrument would be integrated into the curriculum and supplement the currently used learning style analysis.

The researcher administered the questionnaire in order to standardize the introduction and interaction with students. After a brief introduction about the study, the students were asked to complete a consent form that released the data to the researcher. The consent form also requested demographic information about gender, age, and ethnicity (appendix E).

Students were instructed that this was not a test, and that there were no right answers. They were free to choose the "does not apply" or "do not know" category. In addition, the students were encouraged to be as honest as possible and give a fair estimation of themselves. It was emphasized that they not over, or under rate themselves, but describe themselves just as they are.

The introduction, completion of consent form, and completion of the instrument were conducted during one normal class period of fifty minutes. Students with special needs were offered the opportunity to take the instrument in the learning assistance center if more time was requested.

The results from the completed questionnaires were entered into a computer-scoring program that generated individual student profiles with quantitative data in the following areas:

1. A histogram of the eight dominant intelligence scales
2. A histogram of the intelligence styles
3. A rank order listing of specific skills
4. The percentage scores for each dominant intelligence and specific skill subscales

Each instructor received copies of all student profiles that included blank "Brief Learning Summary" worksheets (appendix C). These worksheets were provided so each student could engage in a reflective activity to consider the results.

The researcher analyzed the cumulative data to determine the dominant domains, specific skills, and intellectual styles of the entire population. Reporting of the data generated by the research questions included frequencies and percentages.

In addition, the disaggregated data were examined to determine if there were differences that occurred because of gender, age, and ethnicity. The teacher and student profiles on the dominant MI domains were compared for differences. The presentation of data in table and narrative form for each variable encouraged analysis to explore if any significant patterns emerged through the data.

Limitations

The size and demographics of the study participants created some limitations for the study. At the time the study was planned, the Redwoods District had initiated a General Studies 100 College Skills co-requisite for remedial English students. The originally planned nine sections of General Studies 100 would have yielded two hundred students for this study. A decision to drop the co-requisite resulted in a reduction to four full sections and a smaller study population than initially anticipated.

A second limitation for the study relates to the demographics of the study population. The Redwoods District has a significantly higher concentration of White and Native American students than either the state of California or the

California Community College system. Although closer to the national statistics, there is still a statistically significant difference. The ethnic variations could constitute some variance, but were unknown until the actual demographics of the participants in the study were available for analysis. The small size of the study population resulted in small groupings in specific ethnic groups, thus making statistical analysis by ethnicity unreliable.

Shearer (1996a) indicated that a specific study was conducted to consider cultural bias. "The only observed difference was for the Spatial scale where Caucasian students' mean score was 51% while African-American students scored 45%. . . . These data are strong indications that the MIDAS is not prone to cultural bias and that the results are reliable for both African-American and Caucasian groups" (66). However, he also stated that further research is recommended.

Another area of limitation is related to self-reporting studies. The MIDAS, like any questionnaire, does not represent absolute objectivity. Because questionnaires are reactive in nature, consideration was given to Isaac and Michael's (1997) list of risk factors that may generate misleading information. These include:

1. Tapping respondents who are accessible and cooperative
2. Making respondents feel like this is a normal and natural process to avoid artificial or slanted answers

3. Avoiding arousing *response sets* [emphasis mine]
4. Encouraging participants to not over or under rate (137)

Additionally, the validity of the MIDAS is suspect if 20 percent or more of the items are not answered. Any questionnaires with more than 20 percent of the items unanswered must be eliminated (Shearer 1996a).

Summary

Chapter III reviewed the purpose and described the methodology of the study. The research type was presented as was a description of the setting, population, and sample. The instrumentation and data collection processes were identified and the limitations of the study were discussed. Chapter IV presents the analysis of the data.

CHAPTER IV

ANALYSIS OF DATA

Introduction

Let not the mind run on what thou lackest as much as on what thou hast already.

Marcus Aurelius Antoninus

So build we up the being that we are.

William Wordsworth

The purpose of this study was to identify, according to the MIDAS instrument, the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. A second purpose was to determine whether statistically significant differences existed among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity. A third purpose was to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains.

A review of the literature revealed that the demand for remedial education at the postsecondary level is increasing at an alarming rate. This problem has been called "the education world's equivalent of the elephant-in-the-living-room

syndrome: An enormous problem staring you in the face that everyone can see but no one likes to talk about" (Potter 1997, 11).

Likewise, the controversy about the fundamental nature of intelligence as hereditary or developmental continues to rage with strong advocates in both camps. Related to the nature of intelligence is the equally important issue about how to measure or assess intelligence. The American obsession with testing in the twentieth century reflected "the search for the perfect instrument to help (educators) provide the best possible educational program for their students" (Hoff 1999, 21).

Standardized tests were "designed to measure innate ability and predict future performance instead of evaluating whether students had mastered the material in a curriculum." Testing became a "convenient and powerful instrument of social control" (Hoff 1999, 22), and thus a mechanism to track students.

A provocative advocate in contemporary cognitive science, Howard Gardner (1993a) of Harvard University postulated that intelligence was not only multifaceted, but also developmental in nature. He argued that intelligence was really "an ability or set of abilities that allows a person to solve a problem, fashion a product, or provide a service that is valued within a community" (xii). He believes that current assessment tests measure only linguistic and logical-mathematical capabilities, thereby failing to recognize a broader scope of an individual's knowledge.

This study was conducted to add to the growing body of knowledge that supports the need to assess intelligence in new ways. In particular, little research has been done with the growing population of remedial community college students. Utilizing the validated MIDAS instrument developed by Dr. C. Branton Shearer of Kent State University, the intent of this study was to identify the Multiple Intelligence (MI) characteristics of a remedial community college cohort according to gender, age, and ethnicity. Another goal was to determine if there were significant differences between teachers and students in their identification of dominant MI domains. This information would be useful for future consideration and design of appropriate intervention strategies to improve the success rates for this at-risk population.

The specific research questions established to address these issues were:

1. What are the dominant MI domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

a) Musical

b) Kinesthetic

c) Mathematical

d) Spatial

e) Linguistic

f) Interpersonal

g) Intrapersonal

h) Naturalist

2. What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

3. What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

4. Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

The self-reporting MIDAS questionnaire was administered to the entire population of remedial students enrolled in a General Studies 100 College Skills course at College of the Redwoods in Northern California in spring 1999. There were eighty-two completed instruments, one response was invalid because more than 20 percent of the questions were not completed. One of the eighty-one valid respondents did not indicate ethnicity; age and sex were available for the entire study population.

The purpose of chapter IV is to present an analysis of the data obtained during this study within the framework of the research questions. Chapter IV is divided in the following sections:

1. Description of the sample
2. Presentation of the data
3. Summary of the findings

Description of the Sample

In chapter III, the setting established that the gender, age, and ethnicity of the Redwoods District student population were sufficiently viable from which to draw a sample population to conduct a meaningful study. After administering the MIDAS instrument, the study population was compared to the entire Redwoods District, to the rest of California Community Colleges, and to the national population in order to determine differences (see appendix F for demographic data of the study population). Table 7 shows that the gender distribution compared very closely with a maximum of 1.5 percent difference occurring between the Redwoods District and the study population.

In reviewing age, variations were apparent. Although the national community college student's average age is 29 years and Redwoods is 29.6 years, the study population average age was only 25.5 years. One-third of the study population was 19 or less and another third was 20 to 24 years. The study cohort distribution of 66.7 percent under 24 years is distinctly different from the

TABLE 7

COMPARISON OF COMMUNITY COLLEGE STUDENT POPULATIONS BY GENDER (U.S., CCC, REDWOODS DISTRICT, AND STUDY SUBJECTS IN PERCENTAGES)

Gender	U.S.**	CCC*	Redwoods*	Study
Female	58%	57%	58.5%	57%
Male	42%	43%	41.5%	43%

Sources: *(CCC 1998, n.p.); ** (Estrin 1998, 13; Phillippe 1997, 26)

CCC population of 45 percent under 24 years and Redwoods District with 49.5 percent. The details in the age distribution between the study group and both the Redwoods District and California Community College populations are shown in table 8.

The National Center for Educational Statistics (NCES) study reported that less than one-third of entering freshman ages 19 and under required remediation while almost half (45.3 percent) were over 22 (Ignash 1997, 10-11). This compares more closely with the study population of 32.1 percent who are 19 or less and 43.2 percent over 22. Thus, the study group more closely approximated the national population statistics for remedial community college students.

The next demographic consideration was ethnicity. The study group of remedial students was comprised of a strikingly different distribution as delineated in table 9. The study population consisted of a higher percentage of

TABLE 8

COMPARISON OF COMMUNITY COLLEGE STUDENT POPULATIONS BY AGE (CCC, REDWOODS DISTRICT, AND STUDY SUBJECTS IN PERCENTAGES)

Age	CCC*	Redwoods*	Study
19 or less	19.9%	22.0%	32.1%
20 – 24	25.1%	27.5%	34.6%
25 – 29	13.7%	12.3%	2.5%
30 – 34	9.8%	8.0%	11.1%
35 – 39	8.3%	7.5%	12.3%
40 – 49	11.6%	12.8%	4.9%
50 +	11.3%	9.9%	2.5%
Unknown	0.2%	.1%	

Source: *(CCC 1998, n.p.).

TABLE 9

COMPARISON OF POPULATIONS BY ETHNIC DISTRIBUTION (U.S., CALIFORNIA, CCC, REDWOODS DISTRICT, AND STUDY SUBJECTS IN PERCENTAGES)

Ethnicity	U.S.*	CA**	CCC***	Redwoods***	Study
Asian/Pacific	3.0%	10%	12.7%	2.6%	7.4%
Black	12.3%	7%	7.6%	1.3%	8.7%
Hispanic	9.0%	28%	27.4%	7.1%	9.3%
American Indian	0.8%	1%	1.1%	6.1%	7.4%
White	75.7%	54%	44.4%	79.6%	66%
Unknown			6.8%	3.3%	1.2%

Sources: *(Day 1999, 9); **(Malson 1998, 7); ***(CCC 1998, n.p.).

minority students than the district and national levels. However, there were fewer minorities in the study compared to California and the CCC populations. Although current and disaggregated data specifically for community college remedial students are not available, the NCES study concluded that it was apparent that minority students take more remedial courses (Ignash 1997). This was certainly the case in the Redwoods study population.

In summary, the similarity of gender distribution strengthened the presentation for gender differences that occurred in dominant domains, specific skills, and predominant intellectual styles. Because the younger average age of the study population more closely approximates that of national remedial students, any differences based on age were supported. Lastly, the considerable variances in minority populations and the small size of individual minority populations in the study group made analysis less reliable. Consequently, the study only considered whether there were significant differences between all minority and white students.

Presentation of the Data

Research question one: What are the dominant Multiple Intelligence (MI) domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

a) Musical

b) Kinesthetic

c) Mathematical

d) Spatial

e) Linguistic

f) Interpersonal

g) Intrapersonal

h) Naturalist

Figure 1 displays the means of the aggregate scores on the eight dominant scales for all students (see appendix G for raw data). Students rated themselves highest on the Interpersonal Scale and lowest on the Musical Scale.

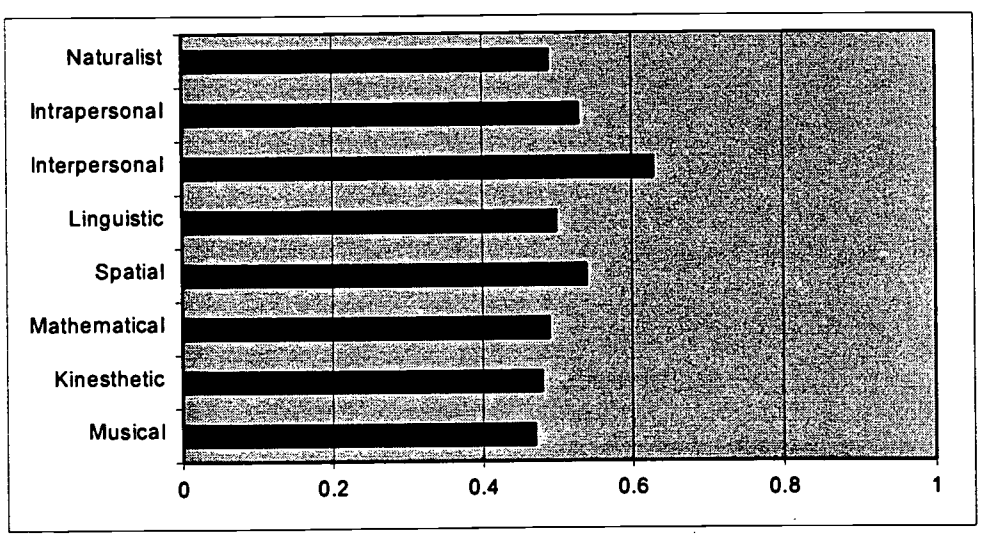


Fig. 1. Comparison of mean scores for all students on the Multiple Intelligence dominant scales.

A comparison of the means on the dominant scales showed significant differences existed between Interpersonal and all other dominant scales. There was a significant difference between the Spatial domain and Musical as well as the Spatial and Kinesthetic. Likewise, there was a significant difference between the Intrapersonal domain and Musical as well as the Intrapersonal and Kinesthetic. Table 10 summarizes the Z scores and the precise confidence levels for all dominant scales showing a significant difference.

TABLE 10

DOMINANT SCALES SHOWING SIGNIFICANT DIFFERENCES

Domains Compared	Z Score	Confidence Level
Interpersonal to Spatial	3.81	99.0%
Interpersonal to Intrapersonal	4.55	99.0%
Interpersonal to Linguistic	5.13	99.0%
Interpersonal to Naturalist	4.99	99.0%
Interpersonal to Mathematical	5.72	99.0%
Interpersonal to Kinesthetic	5.92	99.0%
Interpersonal to Musical	5.90	99.0%
Spatial to Musical	2.46	96.6%
Spatial to Kinesthetic	2.24	97.5%
Intrapersonal to Musical	2.22	97.3%
Intrapersonal to Kinesthetic	1.97	95.2%

A linear regression analysis was conducted to determine if relationships existed among the eight dominant domains. The correlation coefficents are

shown in figure 2. Intrapersonal and Mathematical Intelligences produced a correlation coefficient of 0.83, thus indicating a strong relationship on the Guilford Scale. Twelve of the remaining correlations showed some relationship, and fifteen were weak.

	Mus	Kin	Mat	Spat	Ling	Inter	Intra	Nat
Musical	1							
Kinesthetic	0.29	1						
Math	0.37	0.29	1					
Spatial	0.37	0.44	0.68	1				
Linguistic	0.63	0.32	0.48	0.43	1			
Interpersona	0.26	0.22	0.27	0.31	0.32	1		
Intrapersona	0.47	0.38	0.83	0.66	0.65	0.52	1	
Naturalist	0.36	0.29	0.58	0.5	0.42	0.21	0.58	1

Fig. 2. Correlation coefficients for the dominant scales

The eight dominant scales were then analyzed to determine if there were significant differences considering the variable of gender (see appendix H for data). Figure 3 shows the mean scores for males and females on the eight dominant domains. Females rated themselves higher in every domain except Kinesthetic. However, there were two scales that were significantly different. The males rated themselves significantly higher than the females in Kinesthetic (97.5 percent confidence level) while the females scored themselves significantly higher than the males in Linguistic (99 percent confidence level).

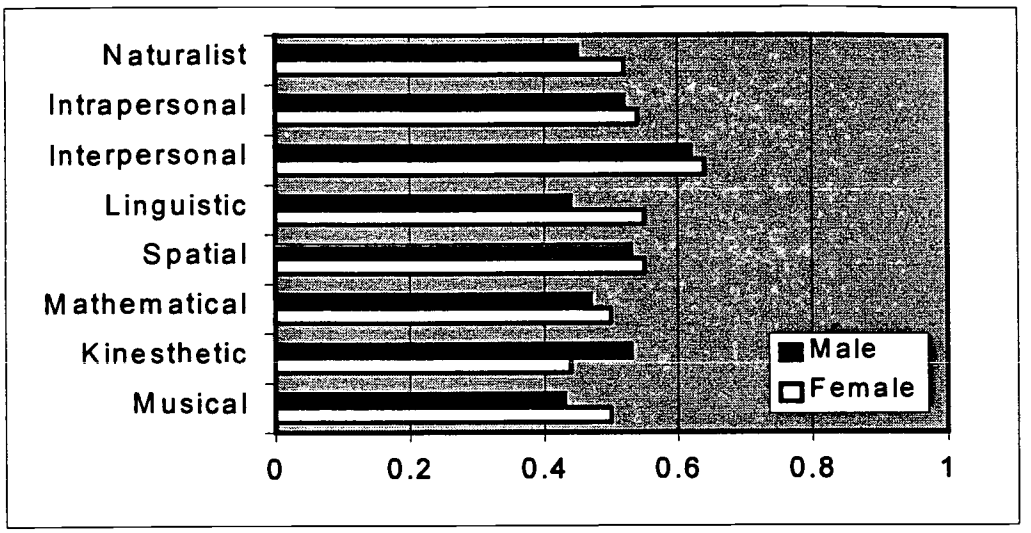


Fig. 3. Comparison of mean scores on the Multiple Intelligence dominant scales by gender

Table 11 shows the rank order of the dominant domains for all students as compared to the rank order according to gender. The males' high ranking of Kinesthetic and low ranking of Linguistic contrasted to the females' higher rating of Linguistic and low of Kinesthetic.

The dominant domains were next analyzed for differences among age groups. Grouping the study population into similar age blocks as seen in table 8 resulted in the two lowest age groupings (19 years or less and 20-24 years of age) of approximately the same size. The remaining subjects were grouped into a third age category of 25 years or older, resulting in three proportionate groups as shown in table 12. These groupings are also a reasonable distribution representing maturity and expertise. The 19 years of age or less students are comprised of recent high school graduates; the 20-24 years of age reflect the

TABLE 11

COMPARISON RANKING OF MULTIPLE INTELLIGENCE
DOMINANT SCALES SHOWING THE MEAN SCORES
FOR ALL SUBJECTS AND BY GENDER

All Students		Male Students		Female Students	
Interpersonal	.63	Interpersonal	.62	Interpersonal	.64
Spatial	.54	Spatial	.53	Spatial	.55
Intrapersonal	.53	Kinesthetic	.53	Linguistic	.55
Linguistic	.50	Intrapersonal	.52	Intrapersonal	.54
Mathematical	.49	Mathematical	.47	Naturalist	.52
Naturalist	.49	Naturalist	.45	Mathematical	.50
Kinesthetic	.48	Linguistic	.44	Musical	.50
Musical	.47	Musical	.43	Kinesthetic	.44

TABLE 12

FREQUENCY CHART SHOWING STUDY POPULATION
IN THREE AGE GROUPINGS

Age Grouping	Number of Subjects	Percentage of Population
19 or less	26	32.1
20 - 24	28	34.6
25 or older	27	33.3

delayed starter; and the 25 years of age or older individuals are the reentry students.

Tests of differences showed none existed among age groups in the domains of Mathematical, Spatial, Interpersonal, Intrapersonal, and Naturalist. Differences appeared in three domains (see appendix I for data). In Musical, the 20-24 year olds rated (Z = 2.38) themselves higher than the 19 years of age or less group. In Kinesthetic, the scores of the 19 years of age or less group were significantly higher (Z = 2.35) than those 25 years of age or older. Lastly, the 20-24 year olds rated themselves higher in the Linguistic domain than those 19 years of age or less (Z = 2.45) as well as the 25 years of age or older group (z = 1.995).

The last variable of ethnicity was considered by comparing all minorities (32.8 percent of the study population) to the White population (66 percent). One subject (1.2 percent) failed to designate ethnicity, so the total number of subjects for ethnic differences was reduced to eighty. An analysis by individual ethnic group was not conducted because of the small size of each group. In addition, the ethnic distribution of the study population varied widely from the Redwoods District, CCC, state, and national statistics. Tests of differences showed none existed (see appendix J for data). The largest difference between minorities and White subjects occurred in Kinesthetic, but the Z score of 1.54 indicated that this was not statistically significant at the 95 percent confidence level.

Research question two: What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

Table 13 summarizes the data for the eight MI domains and their specific skill subscales for the study population (see appendix K for data) as well as disaggregated by gender. Interpersonal and Naturalistic have no dominating subscale, while the other six MI scales have one specific skill subscale that exceeded the other subscales by a tremendous margin.

In particular, the Appreciation skill subscale was extremely high within the Musical scale. The athletic skill subscale superceded Dexterity within the Kinesthetic domain. Everyday problem solving was high within the Mathematical scale. Spatial Awareness excelled on the spatial domain while rhetorical exceeded on the Linguistic. On the Intrapersonal Intelligence subscales, both personal knowledge and effectiveness were high.

It was interesting to note the low skill subscales scores for each domain:

- Instrument on the Musical
- Dexterity on the Kinesthetic
- School math on the Mathematical
- Art design on the Spatial
- Expressive on the Linguistic
- Calculations on the Intrapersonal

TABLE 13

MEAN SCORES ON THE DOMINANT DOMAINS AND SPECIFIC SKILL SUBSCALES FOR ALL SUBJECTS AND BY GENDER

Domain & Skill Subscale	All	Females	Males
Musical	.47	.50	.43
Appreciation	.58	.61	.55
Instrument	.31	.36	.25
Vocal	.39	.44	.32
Composer	.41	.42	.40
Kinesthetic	.48	.44	.53
Athletic	.53	.42	.67
Dexterity	.43	.45	.39
Mathmatical	.49	.50	.47
School math	.41	.41	.42
Logic games	.47	.47	.48
Everyday math	.44	.46	.41
Everyday problem solving	.60	.64	.56
Spatial	.54	.55	.53
Spatial awareness	.60	.57	.63
Art design	.50	.56	.43
Working with objects	.54	.51	.57
Linguistic	.50	.55	.44
Expressive	.44	.49	.38
Rhetorical	.63	.61	.65
Written/reading	.51	.60	.40

TABLE 13—Continued

Domain & Skill Subscale	All	Females	Males
Interpersonal	.63	.64	.62
Persuasion	.59	60	.58
Sensitivity	.60	.65	.54
Working with people	.58	.63	.51
Intrapersonal	.53	.54	.52
Personal knowledge	.59	.63	.54
Calculations	.42	.42	.41
Spatial problem solving	.55	.52	.59
Effectiveness	.58	.59	.56
Naturalist	.49	.52	.45
Science	.47	.49	.44
Animal	.53	.56	.49
Plant	.45	.49	.40

A closer analysis of specific skill subscale mean scores for male and female subjects surfaced significant differences in seven of the twenty-six categories (see appendix L for data). These specific skill subscales, their Z scores, and confidence levels are summarized in table 14. Females exceeded in all subscale categories where there were significant differences except the Athletic specific skill in the Kinesthetic domain.

TABLE 14

SPECIFIC SKILL SUBSCALES SHOWING SIGNIFICANT DIFFERENCES BETWEEN MALE AND FEMALE SUBJECTS

Domain	Specific Skill Subscale	Z Score	Confidence Level
Kinesthetic	Athletic*	4.69	99.9%
Spatial	Art design	2.60	96.0%
Linguistic	Expressive	2.43	96.5%
Linguistic	Written/reading	4.98	99.0%
Interpersonal	Sensitivity	2.23	97.3%
Interpersonal	Working with people	2.46	96.6%
Intrapersonal	Personal knowledge	2.11	96.2%

Note: *Males dominated on this subscale; females dominated in all others.

Tests of differences for each of the specific skill subscales, according to the three age groupings (see appendix M for data), demonstrated five areas of significant difference. These include:

- Music/Appreciation—20 to 24 year olds to the 19 years of age or younger group
- Kinesthetic/Athletic—19 years of age or younger to the 25 years of age or older group
- Math/School math—20 to 24 year olds to the 25 years of age or older group

• Spatial/art design—19 years of age or younger to the 20-24 year old group

• Linguistic/rhetorical—20-24 year olds to the 25 or older group

Consistency in scoring occurred in six subscales. All three Naturalist subscales of science, animal, and plant specific skill categories had exceedingly close means. The other three specific skill categories showing homogeneity in rating were Math/logic games, Math/everyday problem solving, and Interpersonal/sensitivity.

One of the most striking features in the specific skill subscales was the majority of high ratings by the 20-24 year old group. They scored themselves highest in nineteen of the twenty-six specific skill subscales. The 19 years of age or younger group rated themselves highest in the two categories of Kinesthetic/athletic and Spatial/art design while the 25 years of age or older group considered themselves highest in only one category of Spatial/working with objects.

A test for differences in the specific skill subscales between all minority and the White students showed none existed (see appendix N for data). This may reflect the grouping of all minority compared to all white students. This approach was taken because the size of the study population provided extremely small groupings in specific ethnic groups.

Research question three: What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

The test for differences showed no significance among the three intellectual style scales of Leadership, General Logic, and Innovative for the study population. Leadership had the highest mean (.56), then General Logic (.54), and last Innovative (.5).

When the study population was disaggregated by gender (see appendix O for data), the data surfaced significant differences in Leadership (Z = 2.45) and Innovative (Z = 2.689). Females rated themselves higher than the males in all intellectual style scales as shown in figure 4.

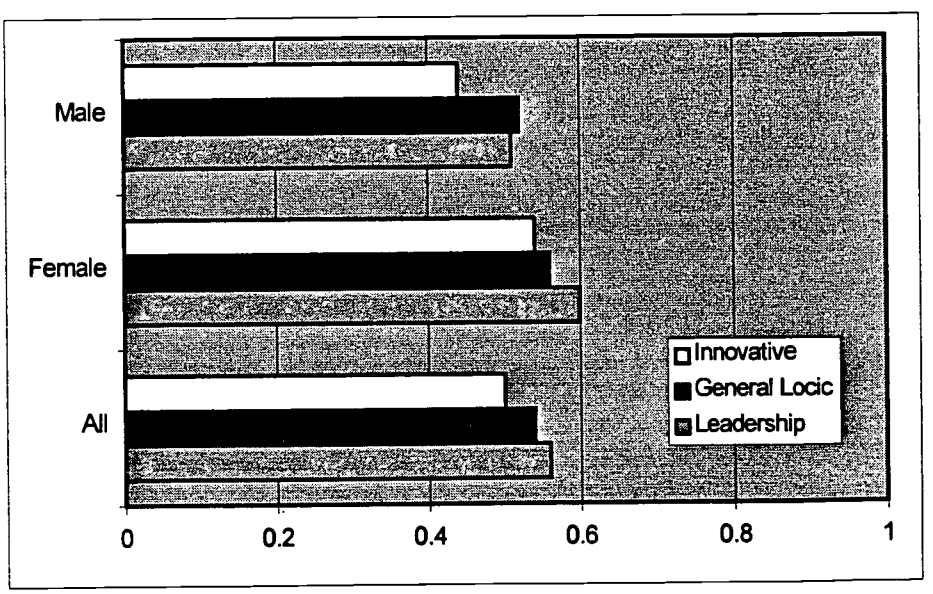


Fig. 4. Comparison of mean scores on the intellectual styles for all subjects and by gender

The test for differences in the intellectual scales according to age showed no significant differences existed (see appendix P for data). However, the 20 to 24 year-old group rated themselves higher in all intellectual categories; there is also a significant difference in their choice of Leadership over Innovative intellectual style. The means for each intellectual style according to age are provided in table 15.

The consideration of differences in the intellectual styles for ethnicity also yielded no significant differences (see appendix Q for data). Table 16 shows the close proximity of the means between minorities and Whites. This homogeneity was expected given the absence of significance that also existed on the dominant scales.

TABLE 15

COMPARISON OF INTELLECTUAL STYLE BY AGE

	Years of Age		
Intellectual Style	19 or less	20 – 24	25 or older
Leadership	.54	.59	.54
General Logic	.53	.57	.53
Innovative	.50	.51	.47

TABLE 16

COMPARISON OF MEAN SCORES IN INTELLECTUAL STYLES
FOR ALL SUBJECTS AND BY ETHNICITY

		Ethnicity	
Intellectual Style	All	Minority Group	White
Leadership	.56	.56	.56
General Logic	.54	.55	.54
Innovative	.50	.49	.50

Research question four: Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

There were eleven completed questionnaires by teachers and interns. These included instructors who were scheduled to teach sections of GS 100 that were later canceled because of low enrollment. Figure 5 shows the mean scores for both the teacher and study participant groups on the dominant scales. The instructors and interns rated Linguistic intelligence as their strongest domain, followed by Intrapersonal and Interpersonal. In comparison, the students ranked Interpersonal, Spatial, and Intrapersonal highest. The extraordinary difference between the Linguistic scores of the instructors and students was significant.

Table 17 shows the ranking of mean scores for the teachers and students on the dominant scales. The teachers' Linguistic score was significantly different

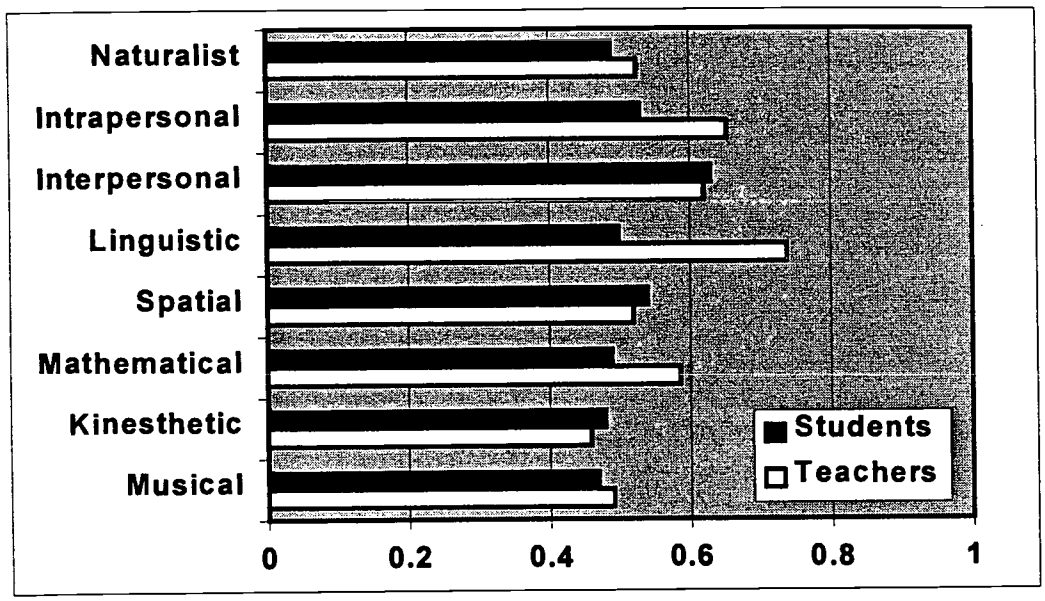


Fig. 5. Comparison of dominant scale mean scores for teachers and students

TABLE 17

COMPARISON RANKING OF MULTIPLE INTELLIGENCE DOMINANT SCALES SHOWING THE MEAN SCORES FOR TEACHERS AND STUDENTS

Teachers		Students	
Linguistic	.74	Interpersonal	.63
Intrapersonal	.65	Spatial	.54
Interpersonal	.62	Intrapersonal	.53
Mathematical	.59	Linguistic	.50
Naturalist	.53	Mathematical	.49
Spatial	.52	Naturalist	.49
Musical	.49	Kinesthetic	.48
Kinesthetic	.46	Musical	.47

from all of the student scores. The Intrapersonal, Interpersonal, and Mathematical scores of the teachers were significantly different from all of the student scores except Interpersonal. Significant differences were not evident in any of the other domains. The similarity in the Interpersonal, Spatial, Musical, and Kinesthetic scores of teachers and students was interesting. The higher mean scores by students in Interpersonal, Spatial, and Kinesthetic are noteworthy because the students had ranked Interpersonal and Spatial intelligences as their strongest domains.

Summary of the Findings

The purpose of this study was to identify, according to the MIDAS instrument, the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. A second purpose was to determine whether statistically significant differences existed among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity. A third purpose was to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains.

The study revealed that the subjects rated themselves highest in Interpersonal Intelligence and lowest on Musical. Significant differences existed between Interpersonal and all of the other seven intelligence domains. The second and third highest scored domains of Spatial and Intrapersonal

Intelligence showed significant differences with the two lowest scored intelligences of Musical and Kinesthetic. A regression analysis produced only one strong relationship between Intrapersonal and Mathematical Intelligences with a correlation coefficient of 0.83.

Consideration of the gender variable demonstrated that females rated themselves higher in all domains except Kinesthetic. Significant differences surfaced in only two domains: Kinesthetic where males exceeded and Linguistic where females dominated.

The variable of age disclosed significant differences in three domains of Musical, Kinesthetic, and Linguistic. Specific differences were as follows:

- Musical—the 20 to 24 year olds rated higher than the 19 years of age or less group
- Kinesthetic—the 19 years of age or less group rated higher than the 25 years of age and older group
- Linguistic—the 20 to 24 year olds rated themselves higher than both the 19 years of age or younger and 25 years of age and older groups

The disaggregated data of the specific skill subscales showed tendencies similar to the dominant domains. Specifically, females scored themselves higher in nineteen of the twenty-six specific skill subscales. Significant differences were found in seven areas with females exceeding in all categories except the Athletic specific skill of the Kinesthetic domain.

Analysis of the specific skill subscales according to age amplified the differences that appeared in the dominant domains. Hence, Appreciation established a major difference in the Musical scale, Athletic in the Kinesthetic, and Rhetorical in the Linguistic. Significant differences appeared in two other specific skill subscales according to age. These were Math/School math where the 20 to 24 year-olds rated themselves higher than the 25 years of age or older group and Spatial/Art design where the 19 years of age or younger group differed significantly from the 20 to 24 year-old group. The most striking feature was the consistently higher scoring by the 20 to 24 year olds in the majority of specific skill subscales (nineteen of twenty-six categories).

In the intellectual styles research scales, the female scores once again were higher than the males with significant differences in Leadership and Innovation, two of the three categories. Likewise, the 20 to 24 year olds rated themselves highest in all three intellectual style research scales.

The variable of ethnicity showed that no significant differences appeared in the dominant domains, the specific skill subscales, or the intellectual style research scales. This homogeneity may reflect the grouping of all minority (n = 27) as compared to White (n = 53) students. This approach was taken because the size of the study population (n = 81, with one student not designating ethnicity) provided extremely small groupings in specific ethnic groups.

Lastly, the comparison between the teachers and students in the identification of dominant MI domains revealed major differences. The instructors rated themselves strongest in Linguistic intelligence, followed by Intrapersonal and Interpersonal while students ranked Interpersonal and Spatial intelligences as their strongest. The teachers' Linguistic score was significantly different from all of the student scores. The Intrapersonal, Interpersonal, and Mathematical scores of the teachers were significantly different from all of the student scores except Interpersonal. Significant differences were not evident in any of the other domains. The similarity in the Interpersonal, Spatial, Musical, and Kinesthetic scores of teachers and students was interesting. The students ranked themselves higher than the teachers on Interpersonal, Spatial, and Kinesthetic.

Chapter IV presented and provided analysis of the data obtained during the study. The next chapter (chapter V) summarizes the study, discusses the major findings, describes the conclusions, and presents implications for actions, and recommendations for further study.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Introduction

> Do not then train youths to learning by force and harshness, but direct them to it by what amuses their minds so that you may be better able to discover with accuracy the peculiar bent of the genius of each.
>
> Plato

Given the controversial nature of intelligence and the wide array of related topics, the contents of chapter V could be sheer hyperbole. Certainly, "the final word on intelligence has not yet been spoken by the scientific community and that it is important to review a range of positions and perspectives" (Gardner, Kornhaber, and Wake 1996, vii).

Gardner continues his writings and research in order to reflect increasingly deep readings of MI theory (Potter 1996). He has written extensively about future directions as well as the educational implications of MI. Gardner has also explored the lives of great minds and leaders to discover how they achieved their extraordinary end-states (i.e., exemplary manifestations of intellectual domains) (Gardner 1995a; 1997a).

MI has also become a popular topic for educators in countless publications with numerous applications in schools throughout the country.

Gardner has no interest in supervising this burgeoning MI empire, but has expressed concern about claims that it is a panacea for education's ills. California educator and MI proponent, Thomas Armstrong (1994) clarified that:

> MI theory is perhaps more accurately described as a philosophy of education, an attitude toward learning, or even a meta-model of education in the spirit of John Dewey's ideas on progressive education rather than a set program of fixed techniques and strategies. As such, it offers educators a broad opportunity to creatively adapt its fundamental principles to any number of educational settings (x).

Considerable research and the convergence of developments in a multitude of disciplines have produced a growing spectrum of ideas to inform and enrich understanding about learning (Potter 1999). The findings from recent, documented, and successful educational reforms are providing new reference points for discussion and action. The thesis has been advanced and a growing cadre of supporters are proclaiming that "U.S. higher education is in the midst of an historic shift from a teaching-centered to a learning-centered paradigm" (Angelo 1999, 4).

This study focused on MI theory and its application to a remedial community college cohort in order to clarify its potential contribution to a learner-centered environment. Chapter V reiterates the purpose of the study and research questions, reviews the key findings, draws conclusions, and recommends future research possibilities. The educational implications of the findings are also discussed.

Purpose of the Study and Research Questions

The primary purpose of this study was to identify, according to the MIDAS instrument, the dominant domains, specific skills, and predominant intellectual styles of remedial community college students. A second purpose was to determine whether statistically significant differences existed among students in their identification of a particular dominant domain, specific skill, or intellectual style in regard to the variables of gender, age, and ethnicity. A third purpose was to determine whether there were statistically significant differences between teachers and students in their identification of dominant MI domains.

A review of the literature was conducted pertaining to these topics and organized as follows:

1. Derivation of Multiple Intelligence Theory
2. Definition and Educational Implications of MI Theory
3. Assessment of Intellectual Capacity
4. Remediation in Higher Education
5. Application of MI to Remediation in Higher Education
6. MI Assessment Instruments
7. Interpreting the MIDAS Instrument

The literature review revealed that the personalized educational perspective of MI has significant implications for learning. However, current assessments that measure predominantly linguistic and logical-mathematical skills provide limited information about student abilities. The growing remedial population, in particular at community colleges, requires new approaches to deal

with these at-risk students. MI assessment of remedial community college students and teachers using the MIDAS instrument would describe their intellectual capacities in order to define improved methodologies for enhancing student success. Therefore, this study sought to describe the MI tendencies of remedial community college students and teachers using the following research questions:

1. What are the dominant MI domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

a) Musical

b) Kinesthetic

c) Mathematical

d) Spatial

e) Linguistic

f) Interpersonal

g) Intrapersonal

h) Naturalist

2. What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

3. What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

4. Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

Methodology of the Study

Descriptive and ex post facto research designs were used in this study. A remedial cohort was drawn from students enrolled at College of the Redwoods in Eureka California. The demographics of the Redwoods District indicated many similarities to national and California Community College statistics that supported drawing a sample population of students for this study. The selected cohort comprised all students (n = 81) in four sections of General Studies 100 College Skills for the spring 1999 term.

Students enrolled in this course were assessed with remedial English proficiency through their entrance exams. The College Skills curriculum focuses on student success strategies, thereby providing an ideal situation for a MI study. All participating instructors completed the selected Multiple Intelligence Developmental Assessment Scales (MIDAS) instrument and were provided their individual MIDAS profiles prior to implementation of the study.

The researcher introduced the study and administered the MIDAS to all College Skills students as part of a regular class activity. The data from the completed questionnaires were entered into a computer program and individual profiles generated that were distributed to all of the participants. Instructors

decided on an individual basis how to use that information as part of the instructional process.

Data were collated with calculation of mean scores for the MI dominant scales, specific skill subscales, and the research scales to determine if, and where, significant differences existed. Correlation coefficients were also considered for the dominant scales. The variables of gender, age, and ethnicity were also analyzed for significant differences in the dominant domains, specific skill subscales, and research scales. Teacher and student ratings on the dominant domains were also compared.

Summary of Findings

The findings are summarized below according to the four research questions.

Research question one: What are the dominant MI domains, as identified by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

1. The study revealed that the subjects rated themselves highest in Interpersonal Intelligence and lowest on Musical. Significant differences existed between Interpersonal and the other seven intelligence domains.

2. The second and third highest-scored domains of Spatial and Intrapersonal Intelligence showed significant differences with the two lowest scored intelligences of Musical and Kinesthetic.

3. A regression analysis produced one strong relationship between Intrapersonal and Mathematical Intelligences with a correlation coefficient of 0.83.

4. Consideration of the gender variable demonstrated that females rated themselves higher in all domains except Kinesthetic. Significant differences surfaced in only two domains: Kinesthetic where males exceeded and Linguistic where females dominated.

5. The variable of age disclosed significant differences in the three domains of Musical, Kinesthetic, and Linguistic as follows:

- Musical, the 20 to 24 year olds rated themselves higher than the younger group,
- Kinesthetic, the 19 years of age or less group rated themselves higher than the 25 years of age and older group, and
- Linguistic, the 20 to 24 year olds rated themselves higher than both the younger and older groups.

Research question two: What are the specific skills within each MI domain, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

1. The disaggregated data of the specific skill subscales showed tendencies similar to the dominant domains. Specifically, females scored themselves higher in nineteen of the twenty-six specific skill subscales.

Significant differences were found in seven areas with females exceeding in all categories except the Athletic specific skill of the Kinesthetic domain.

2. Analysis of the specific skill subscales according to age amplified the differences that appeared in the dominant domains. Hence, Appreciation established a major difference in the Musical scale, Athletic in the Kinesthetic, and Rhetorical in the Linguistic.

3. Significant differences appeared in two other specific skill subscales according to age. These were Math/School math where the 20 to 24 year olds rated themselves higher than the 25 years of age or older group and Spatial/Art design where the nineteen years of age or younger group differed significantly from the 20 to 24 year-old group.

4. A striking feature was the consistently higher scoring by the 20 to 24 year olds in the majority of specific skill subscales (nineteen of twenty-six categories).

Research question three: What are the predominant intellectual styles, as defined by the MIDAS, for remedial community college students in the study population according to gender, age, and ethnicity?

1. No significant differences were found among the three intellectual style scales of Leadership, General Logic, and Innovation.

2. The females rated themselves higher than males with significant differences in Leadership and Innovation.

3. The 20 to 24 year olds rated themselves highest in all three intellectual style research scales.

The variable of ethnicity showed that no significant differences appeared in the dominant domains, the specific skill subscales, or the intellectual style research scales. This homogeneity may reflect the grouping of all minority (n = 27) as compared to White (n = 53) students. This approach was taken because of the size of the study population (n = 80, because one student did not designate ethnicity) provided extremely small groupings in specific ethnic groups.

Research questions four: Is there a significant difference in the identification of dominant MI domains, as identified by the MIDAS, between teachers and students in this study?

1. The instructors rated themselves strongest in Linguistic intelligence, followed by Intrapersonal and Interpersonal while students ranked Interpersonal and Spatial intelligences as their strongest.

2. The teachers' Linguistic score was significantly different from all of the student scores. The Intrapersonal, Interpersonal, and Mathematical scores of the teachers were significantly different from all of the student scores except Interpersonal. The similarity in the Interpersonal, Spatial, Musical, and Kinesthetic scores of teachers and students was interesting.

3. The students ranked themselves higher than the teachers on Interpersonal, Spatial, and Kinesthetic.

Conclusions

Based on the findings of this study, several general conclusions can be drawn. The remedial community college students in this study indicated that

their strongest intelligence was in the Interpersonal domain, followed by Spatial and Intrapersonal. The self-identification of communication with others as a strength provides a critical instructional clue for faculty.

Adherence to adult learning theory implies that teaching strategies directed to the learners' abilities are likely to be more successful. Results from this study indicated approaches that engage Interpersonal and Spatial intelligences would have a greater chance of capturing these students' attention and interest. However, the teachers in this study ranked Linguistic and Intrapersonal as the strongest intelligences and rated Interpersonal and Spatial similar to the ratings of the students.

Most instructors teach the way they were taught and attained their status because of their strong Linguistic and Logical-Mathematical abilities. Faculty must be made aware of these differences and encouraged to modify their teaching methodology to incorporate instructional approaches that offer interpersonal learning activities. In-service opportunities must be provided that enable teachers to experiment and implement strategies that involve interactive and small group activity.

Although the instructor sample was extremely small, these conclusions are valid because of the strong differences that appeared. The differences between teachers and students must be addressed because they relate to an extremely important and fundamental issue related to instructional methodology. The preliminary information from this study suggests that additional research

comparing student and teacher profiles would verify these results and help clarify and direct the need for educational reform.

Conclusions can also be drawn from the disaggregated student data by gender. Significant differences were found in two areas of perceived ability. Males ranked Kinesthetic higher than females, while females ranked Linguistic higher than males. Also notable are the higher ratings by females in all dominant domains, except Kinesthetic, and in nineteen of the twenty-six specific skill subscale categories. It would be interesting to know if the higher female scores reflected greater self-esteem or whether the males suffered from lack of confidence. Additional research would determine if these perceived preferences reflect socially accepted roles or more fundamental gender differences.

The gender differences found in this study reflect issues related to current research and pose new questions for future studies. Jarvis, Holford, and Griffin (1998) stated that adult learning models are usually predicated on the masculine norm and little effort has been made to explore whether there is anything special about how women learn.

Studies completed since the 1970s have begun to demonstrate the existence of profound differences between the development of males and females. Kemener contrasted adjectives typically used to describe male and female students. Males are commended for being active, adventurous, energetic, curious, or inventive; while females are considerate, cooperative, poised, sensitive, or dependable (cited in Jarvis, Holford, and Griffin 1998).

Women's Ways of Knowing (Belenky et al. 1986) is considered a classic study that firmly established that there are significant differences in learning styles between genders. Women have a more relational orientation and used a distinct language based on speaking and listening. This research suggested that women have a unique way of knowing that is different than men (cited in Jarvis, Holford, and Griffin 1998).

Additional gender-based research by Carol Gilligan concluded that females develop a morality based on ideas of care and responsibility compared to that of males based on rights (Jarvis, Holford, and Griffin 1998). A more recent study reported in Women in Higher Education confirmed the existence of gender differences and "suggested that traditional education settings may not be the best learning environments for females" (cited in O'Banion 1997, 87).

The gender differences in this study support distinctions that surfaced in other studies. Recommending actions based on gender differences is not only controversial but also complicated by the multiple sources that may contribute to any variation. There is a need to distinguish whether sources of variation are the result of biological, developmental, and/or contextual influences (Dart and Boulton-Lewis 1998).

The implications for some *gendered* learning contexts on learning behavior are significant. A practical common-sense interpretation suggests that faculty must recognize that women react to phenomena differently, and interaction must be modified to consider these differences. In extreme cases, segregated instruction for certain subjects may prove beneficial. This difficult

research area requires further exploration because of the compounding influences.

Similar concerns can be directed to the consistently higher scoring by the 20 to 24 year-old group in nineteen of the twenty-six specific skill subscale categories as well as all three intellectual style research scales. The question arises whether the 20 to 24 year olds perceived themselves as more accomplished, whether the lower scores of the younger group reflect limited experience, and/or whether the older group underrated their abilities. Further studies are necessary to distinguish whether there are other influences (such as socioeconomic status, motivation, and experience) that account for variation by age.

Finally, conclusions based on the variable of ethnicity were not possible because no significant differences surfaced in the dominant domains, specific skill subscales, and research scales. However, this study compared all ethnic groups to the White subjects because there were insufficient numbers to enable analysis by individual ethnic groups. In addition, other variables may confound the situation making it difficult to distinguish if culture is the affecting variable. For example, the absence of differences by ethnicity may reflect the overall low socioeconomic status of the study population since over 40 percent of Redwoods District students are eligible for financial aid.

Other research has established that there are significant differences in learning styles among cultural groups (O'Banion 1997). That social context influences learning is a major premise of MI theory. However, culture is a very complex phenomenon. What and how people learn is likely to be different in

different cultural and social contexts. It is much easier to say that culture is very important than to describe the impact of different cultures. What counts as knowledge differs between cultural contexts (Jarvis, Holford, and Griffin 1998).

In summary, the strongest conclusions were derived from the perceived strengths in dominant domains and the striking differences that surfaced between students and teachers. Also, strong distinctions arose in the ratings between male and female students that support the growing body of knowledge about gender differentials. Age appeared to present another important differential of perceived ability. Ethnicity did not surface significant differences, but the limitations of the study provided insufficient data for any meaningful findings.

Because student learning is a complex multivariate phenomenon, additional research is critical to amplify these findings. Some directions for future research that evolved from the findings and conclusions of this study are suggested in the next section.

Recommendations for Further Study

Current applications of MI are voluminous. Studies of remedial students are also increasing as this at-risk population grows steadily. Controversy continues to swirl around assessment with many educators recognizing the need to focus this effort in a diagnostic direction (Traub 1998). This study attempted to merge these divergent issues into a thematic whole, thereby contributing to current thinking about the learner and productive learning environments for at-risk remedial community college students.

There are many rich opportunities for additional research. The following are recommended for future studies:

1. A replication study with a larger population of remedial community college students would substantiate, refute, and/or amplify the findings of this study. In particular, the gender and age differences that emerged necessitate further substantiation; and differences based on ethnicity need to be determined. If similar results emerged, this would confirm characteristics of this at-risk cohort and support the need for specific strategies to improve their academic performance.

2. A longitudinal study could identify differences according to age and gender. These data could clarify any gender dominant intelligences and whether individuals exhibit different strengths at different ages (i.e., a developmental trajectory of intelligences).

3. A study collecting data from traditional freshman college classes as well as a remedial cohort would provide interesting comparative data about the existence of similarities and/or differences.

4. Another study could assess instructors to define their dominant domains, specific skills, and intellectual styles. If the population were sufficient or institution-wide, it would be possible to determine if these tendencies varied depending upon discipline.

5. A comparative study that examined MI assessment data of students and teachers would be extremely informative to substantiate the differences in

strengths. This would support the need for a MI regular assessment process so that teaching strategies would focus on the specific needs of students.

6. Future studies should go beyond MI assessment and involve implementation of strategies based on assessment results. Using quasi- or true-experimental designs, these studies would provide the opportunity to measure the effect of an experimental strategy to determine if those students were more successful in a specific course, or in their academic career.

7. Other studies could assess specific audiences such as people with various learning disabilities or culturally mixed groups or vocational students.

8. A study that analyzed differences in MI profiles based on socioeconomic status would be informative.

9. Lastly, a study conducted in different work environments would be instructive to determine what intelligences are employed in the workplace.

This suggested list is far from exhaustive. Howard Gardner (1990; 1991; 1993a; 1993b; 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997b; 1997a; 1997b) has recommended countless research possibilities. Gardner's ideas are most interesting because they offer constructive consideration of MI's future. He is convinced that there will be additional work on the scientific underpinnings of MI. Neuroscientists will have greater knowledge of how the nervous system and brain function. Thus, the conduct of various intellectual activities as well as their genetic construct will be better understood. Future research may confirm and expand the list of intelligences.

More importantly, the current focus on alternative means of assessment will continue and educators will create new methods of assessing intelligences in a naturalistic and intelligence-fair manner. MI will be taken seriously, and progress will include development of curricular approaches that prove effective for individuals with different intellectual profiles. The ideas of MI will become part of teacher training. There will be studies about intelligences deployed in workplaces, organizations, and institutions (Gardner 1993b).

Gardner has stated the following about his future research:

> In addition to work on the educational implications of MI theory and the extension of that work to the realm of creativity, I have been involved in one other line of study that grows out of MI theory. The positing of different intelligences implies two further considerations: Why do human beings possess particular intelligences, and what are the factors that lead intelligences to develop as they do? (Gardner 1993a, xviii)

His future work will likely take on four forms:

1. Studies of the diverse contexts in which intelligences develop and of the ways in which they develop in those contexts.
2. Studies of the phenomena of human creativity and how best to enhance it.
3. An examination of the ethical dimensions of human intelligences.
4. A consideration of leadership for our times. (Gardner 1993a, xxiii-xxiv)

An articulate and prolific scholar, Gardner has spawned an exciting educational dialog with a wealth of research possibilities to occupy several lifetimes of work. There is little doubt that future researchers will continue these explorations of intelligence in many directions and yet unknown realms.

Implications for Action

The findings from this study suggest a range of possibilities for education reform. Gardner (1993b) has expressed dismay that the educational reform discussion has focused too much on methodology and technologies. "Nearly all educators also acknowledge the failure of the entrenched factory model of education, in which students are all served the same curriculum in the same assembly-line fashion and teachers are cogs in a massive bureaucratic apparatus" (82).

According to Gardner (1993b), "a significant part of our educational malaise lay in the mindless instruments that were conventionally used to assess student learning and, not incidentally, to signal what learning is" (159). Meaningful reform will be attained only if change is directed to the fundamental concern of accurate and individualized assessment as the basis for personalized instruction.

Understanding the intellectual profile of the individual learner is critical to any pedagogical program and central to an education that maximizes each individual's intellectual potential. The purpose of school should be to develop intelligences in order to help students reach vocational and avocational goals appropriate to their intelligences.

A careful assessment procedure must go beyond linguistic and mathematical skills and permit a more enlightened search to remedy difficulties. The student must be shown alternative routes to an educational goal (learning mathematics via spatial relations, learning music through linguistic techniques).

MI does not guarantee a royal road to success, but has the potential to promote positive student learning. It suggests a new way to examine assumptions about achievement and consider different strategies to teaching and learning.

The basic MI premises that people are different and have different minds constitutes a powerful entry point for personalized learning. The teacher who acknowledges and responds accordingly will facilitate learning success for more learners. This may appear to be stating the obvious, but difficult to implement when assessment is conducted in only the traditional manner. The importance of accurate assessment as the first important step in creating an improved learning environment cannot be over emphasized. Assessment guru, Thomas A. Angelo (1999) has stated:

> That most assessment efforts have resulted in little learning improvement because they have been implemented without a clear vision of what "higher" or "deeper" learning is and without an understanding of how assessment can promote such learning. I'll also propose that our piecemeal attempts stem partly from a mechanistic additive model of assessment, which needs to be replaced by a transformative assessment-as-culture-change model if we're to make real progress. (4)

He suggested that a new mental model is needed in which academia values self-examination, reflection, and continuous improvement.

A new mental model has been advocated by other educators who are conducting research in MI and related fields of study. Pat Burke Guild (1997) reported on schools using learning styles, brain-based education, and multiple intelligences. The underlying commonality of these different approaches is the need for serious understanding of the learner and the learning process.

A meta-model developed by Silver, Strong, and Perini (1997) linked the process-centered approach of learning styles and the content and product-driven multiple intelligence theory (25). The two theories complement each other and demonstrate how the variability within particular intelligences is related to the distinct styles of different individuals.

Silver, Strong, and Perini's (1997) attempt to form an integrated model of human intelligence and learning is one of many current efforts. A great deal of rhetoric about the learner, learning opportunities, and the learning organization is permeating higher educational journals. Hopefully, this growing dialog is the beginning of an effective new discourse on educational reform.

Summary

The MI pedagogical wave focuses on the learner to build skills for success. "The theory offers both the tools to reform rigid traditional education programs and the vehicle to sustain quality . . . learning communities into the twenty-first century" (Weber 1996, 76). Real reform, according to Gardner (1993b), must get down to the basics of what an ordinary citizen needs to know to cope in this rapidly changing world.

> Ultimately, in some distant but still imaginable future, it should be possible to develop the educational environment that is optimal for each student at a particular historical moment; we will be aided in this process by better measuring devices, better understanding of the role of cultural milieu and distributed artifacts, more sensitive behaviors on the part of teachers and parents, and, not least, by the individual's own increasing awareness of his or her own characteristic intellectual strengths and style. Hand-in-glove with an accurate and accurately evolving description of each person's intelligence is the need for an educational regimen that helps every person achieve his or her maximal potential across the range of disciplines and crafts. (228-9)

Personalized learner-centered education holds the promise of more thoughtful schooling that goes beyond knowledge based on recall to deeper forms of understanding. Indeed, educators today are challenged to assess students in new and more meaningful ways that identify abilities and interests. They are also challenged to link a more comprehensive assessment to instruction so students can achieve their optimal potential. There is great potential in an integrated *systems* approach for richer learning environments that help all students achieve greater success.

APPENDICES

APPENDIX A

THE MIDAS INSTRUMENT

MIDAS

by
C. Branton Shearer, Ph.D.

MUSICAL

1. As a child, did you have a strong liking for music or music classes?
A= A little.
B= Sometimes.
C= Usually.
D= Often.
E= All the time.
F= I don't know.

2. Did you ever learn to play an instrument?
A= No.
B= A little.
C= Fair.
D= Good.
E= Excellent.
F= I don't know.

3. Can you sing "in tune"?
A= A little bit.
B= Fair.
C= Well.
D= Very well.
E= Excellent.
F= I don't know.

4. Do you have a good voice for singing with other people in harmony?
A= A little bit.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

5. As an adult, did you ever play an instrument, play with a band or sing with a group?
A= Never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all of the time.
F= I don't know. Does not apply.

6. Do you spend a lot of time listening to music?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

7. Do you ever make up songs or write music?
A= Never.
B= Once or twice.
C= Every once in a while.
D= Sometimes.
E= Often.
F= I don't

8. Do you ever drum your fingers, whistle or sing to yourself?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

9. Do you often have favorite tunes on your mind?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

10. Do you often like to talk about music?
A= Never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Nearly all the time.
F= I don't know.

11. Do you have a good sense of rhythm?
A= Fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

12. Do you have a strong liking for the SOUND of certain instruments or musical groups?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

13. Do you think you have a lot of musical talent or skill that was never fully brought out?
A= No.
B= Some.
C= A fair amount.
D= A good amount.
E= A great deal.
F= I don't know.

14. Do you often have music on while you work, study or relax?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost always.
E= Always.
F= I don't know.

1.

PHYSICAL:

15. In school, did you generally enjoy sports or gym class more than other school classes?
A= Not at all.
B= A little.
C= About the same.
D= Enjoyed sports more.
E= Enjoyed sports much more.
F= I don't know.

16. As a teenager, how often did you play sports or other physical activities?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost always.
E= All the time.
F= I don't know or does not apply.

17. Did you ever perform in a school play or take lessons in acting or dancing?
A= Never.
B= Maybe once.
C= A couple of times.
D= Often.
E= Almost all the time.
F= I don't know.

18. Do you or other people (like a coach) think you are coordinated, graceful or a good athlete?
A= No.
B= Maybe a little.
C= About average.
D= Better than average.
E= Superior.
F= I don't know.

19. Did you ever take lessons or have someone teach you a sport such as bowling, karate, golf, etc.?
A= No.
B= Rarely.
C= Sometimes.
D= Often.
E= Nearly all the time.
F= I don't know.

20. Have you ever joined "teams" to play a sport?
A= Never.
B= Rarely.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

21. As an adult, do you often do physical work or exercise?
A= Rarely.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know. Does not apply.

22. Are you good with your hands at things like card shuffling, magic tricks or juggling?
A= Not very good.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

23. Are you good at doing precise work with your hands such as sewing, making models, "tying flies, typing or have good handwriting?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know

24. Do you enjoy working with your hands on projects such as mechanics, building things, preparing fancy food or sculpture?
A= Never or rarely.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know or doesn't apply.

25. Are you good at using your body or face to imitate people such as teachers, friends, or family?
A= Not at all.
B= A little bit.
C= Fair.
D= Good.
E= Very good.
F= I don't know.

26. Are you a good dancer, cheerleader or gymnast?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

27. Do you learn better by having something explained to you or by doing it yourself?
A= Always better by explanation.
B= Sometimes better by explanation.
C= No difference.
D= Usually better by doing it.
E= Always better by doing it.
F= I don't know.

MATH/LOGIC

28. As a child, did you easily learn math such as addition, multiplication and fractions?
A= Not at all.
B= It was fairly hard.
C= Pretty easy.
D= Very easy.
E= Learned much quicker than all the kids.
F= I don't know.

29. In school, did you ever have extra interest or skill in math?
A= Very little or none.
B= Maybe a little.
C= Some.
D= More than average.
E= A lot. ___
F= I don't know.

30. How did you do in advanced math classes such as algebra or calculus?
A= Didn't take any.
B= Not very well.
C= Fair. (C's)
D= Well. (B's)
E= Excellent. (A's)
F= I don't know or does not apply.

31. Have you ever had interest in studying science or solving scientific problems?
A= No.
B= A little.
C= Average.
D= More than average.
E= A great deal.
F= I don't know.

32. Are you good at playing chess or checkers?
A= No.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

33. Are you good at playing cards or solving strategy or puzzle-type games?
A= Not at all.
B= A little.
C= About average.
D= Better than average.
E= Excellent.
F= I don't know.

34. Do you often play games such as Scrabble or crossword puzzles?
A= Very rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

35. Do you have a good system for balancing a checkbook or figuring a budget?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= An excellent system.
F= I don't know or does not apply.

36. Do you have a good memory for numbers such as telephone numbers or addresses?
A= Not very good.
B= Fair.
C= Good.
D= Very good.
E= Superior.
F= I don't know.

37. How are you at figuring numbers in your head?
A= Can not do it.
B= Not very good.
C= Fair.
D= Good.
E= Excellent.
F= I don't know.

38. Are you a curious person who likes to figure out WHY or HOW things work?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

39. Are you good at inventing "systems" for solving long or complicated problems? For example, betting at the race track or organizing your home or life?
A= Not very good.
B= A little.
C= Somewhat.
D= More than average.
E= Very much so.
F= I don't know.

40. Are you curious about nature like fish, animals, plants or the stars and planets?
A= A little.
B= Sometimes
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

41. Have you ever liked to collect things and learn all there is to know about a certain subject such as antiques, horses, baseball?
A= Not at all.
B= A little.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

42. Are you good at jobs or projects where you have to use math a lot or get things organized?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know or does not apply.

43. Outside of school, have you ever enjoyed working with numbers like figuring baseball averages, gas mileage, budgets, etc.?
A= Not at all.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time
F= I don't know.

44. Do you use good common sense for planning social activities, making home repairs, or solving mechanical problems?
A= Sometimes.
B= Usually.
C= Often.
D= Almost all the time.
E= All the time.
F=I don't know.

SPATIAL

45. As a child, did you often build things out of blocks or boxes, play with jacks, marbles or jump rope?
A= Never or rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

46. As a teenager or adult, how well could you do any of these: mechanical drawing, hair styling, woodworking, art projects, auto body, or mechanics?
A= Didn't take any.
B= Fair.
C= Good. (C's)
D= Very good. (B's)
E= Excellent. (A's)
F= I don't know. Does not apply.

47. How well can you "design" things such as arranging or decorating rooms, craft projects, building furniture or machines?
A= Never do.
B= Not very well.
C= Pretty good.
D= Good.
E= Excellent.
F= I don't know.

48. Can you parallel park a car on your first try?
A= Rarely or do not drive.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know. Does not apply.

49. Are you good at finding your way around new buildings or city streets?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

50. Are you good at using a road map to find your way around?
A= Not at all.
B= A little bit.
C= Good at it.
D= Very good.
E= Excellent at reading maps.
F= I don't know.

51. Are you good at fixing "things" like cars, lamps, furniture, or machines?
A= Not at all.
B= Not very good.
C= Fair.
D= Good .
E= Excellent.
F= I don't know.

52. How easily can you put things together like toys, puzzles, or electronic equipment?
A= Not at all.
B= It was hard.
C= It was fairly easy.
D= It was easy.
E= It was very easy.
F= I don't know.

53. Have you ever made your own plans or patterns for projects such as sewing, carpentry, crochet, woodworking, etc.?
A= Never.
B= Maybe once.
C= Every once in a while.
D= Sometimes.
E= Often.
F= I don't know.

54. Have you ever drawn or painted pictures?
A= Rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know

55. **Do you have a good sense of design for decorating, landscaping or working with flowers?**
A= Not very good.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

56. **Do you have a good sense of direction when in a strange place?**
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Superior.
F= I don't know.

57. **Are you good at playing pool, darts, riflery, archery, bowling, etc.?**
A= Not at all.
B= A little.
C= Fair.
D= Better than average.
E= Excellent.
F= I don't know.

58. **Do you often draw a picture or sketch to give directions or explain an idea?**
A= Never.
B= Rarely.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

59. **Are you creative and like to invent or experiment with unique designs, clothes or projects?**
A= Very little or not at all.
B= A little.
C= Somewhat.
D= Often.
E= Almost all the time.
F= I don't know.

LINGUISTIC

60. **Do you enjoy telling stories or talking about favorite movies or books?**
A= Not at all.
B= Rarely.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I'm not sure.

61. **Do you ever play with the <u>sounds</u> of words like making up jingles, or rhymes? For example, do you give things or people funny sounding nicknames?**
A= Never.
B= Rarely.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

62. **Do you use colorful words or phrases when talking?**
A= No.
B= Rarely.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

63. **Have you ever written a story, poetry or words to songs?**
A= Never.
B= Maybe once or twice.
C= Occasionally.
D= Often.
E= Almost all the time.
F= I don't know.

64. **Are you a convincing speaker?**
A= Not at all.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all of the time.
F= I don't know.

65. **How are you at bargaining or making a deal with people?**
A= Not very good.
B= Fair.
C= Pretty good.
D= Good.
E= Excellent.
F= I don't know.

66. **Can you talk people into doing things your way when you want to?**
A= Not at all.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I'm not sure.

5.

67. Do you ever do public speaking or give talks to groups?
A= Very rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

68. How are you at managing or supervising other people?
A= Never do or not very good at it.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know or does not apply.

69. Do you have interest for talking about things like the news, family matters, religion or sports, etc.?
A= A little.
B= Some interest.
C= Average interest
D= More than average.
E= A great deal.
F= I don't know.

70. When others disagree are you able to easily say what you think or feel?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

71. Do you enjoy looking up words in dictionaries, or arguing with others about "the right word" to use?
A= Never or rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Very often.
F= I don't know.

72. Are you often the one asked to "do the talking" by family or friends because you are good at it?
A= Very rarely or never.
B= Rarely.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

73. Have you ever been good at imitating the way other people talk?
A= Not really.
B= Fairly good.
C= Pretty good.
D= Good.
E= Very good.
F= I don't know.

74. Have you ever been good at writing reports for school or work?
A= Not really. Never do any.
B= Pretty good.
C= Good.
D= Very good.
E= Superior.
F= I don't know.

75. Can you write a good letter?
A= No or fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

76. Do you like to read or did you do well in English classes?
A= A little.
B= Sometimes.
C= Usually.
D= Often
E= All the time.
F= I don't know.

77. Do you write notes or make lists as reminders of things to do?
A= Rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

78. Do you have a large vocabulary?
A= Not really.
B= Less than average.
C= About average.
D= Above average.
E= Superior.
F= I don't know.

79. Do you have skill for choosing the right words and speaking clearly?
A= Not at all or rarely.
B= Sometimes.
C= Usually.
D= Most of the time.
E= Almost always.
F= I don't know.

INTERPERSONAL

80. Have you had friendships that have lasted for a long time?
A= One or two.
B= More than a couple.
C= Quite a few.
D= A lot.
E= A great many long lasting friendships.
F= I don't know.

81. Are you good at making peace at home, at work or among friends?
A= Fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

82. Are you ever a "leader" for doing things at school, among friends or at work?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost always.
F= I don't know

83. In school, were you usually part of a particular group or crowd?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Most of the time.
E= Almost all the time.
F= I don't know.

84. Do you easily understand the feelings, wishes or needs of other people?
A= Sometimes.
B= Usually.
C= Often.
D= Almost always.
E= Always.
F= I don't know.

85. Do you ever offer to "help" other people such as the sick, the elderly or friends?
A= Sometimes.
B= Usually.
C= Often.
D= Very often.
E= Always.
F= I don't know.

86. Do friends or family ever come to you to talk over personal troubles or to ask advice?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

87. Are you a good judge of "character"?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost always.
E= Always.
F= I don't know.

88. Do you usually know how to make people feel comfortable and at ease?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost always.
E= Always.
F= I don't know.

89. Do you generally take the good advice of friends?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Often.
E= Almost always.
F= I don't know.

90. Are you generally at ease around (men or women) your own age?
A= Rarely.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= Always.
F= I don't know.

91. Are you good at understanding your (girlfriend's or wife's) (boyfriend's or husband's) ideas and feelings
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know. Does not apply.

92. Are you an easy person for people to get to know?
A= Not at all.
B= Pretty hard.
C= Fairly easy.
D= Easy.
E= Very easy.
F= I don't know.

93. Do you have a hard time coping with children?
A= Usually have a hard time.
B= Sometimes it is hard.
C= Usually easy.
D= Almost always easy.
E= Always very easy.
F= I don't know.

94. Have you ever had interest in teaching, coaching or counseling?
A= Very little or none.
B= A little interest.
C= Some interest.
D= A lot of interest.
E= A great deal of interest.
F= I don't know or doesn't apply.

95. Can you do well when working with the public in jobs such as sales, receptionist, promoter, police, or waiter?
A= Fair.
B= Fairly well.
C= Well.
D= Very well.
E= Excellent.
F= I don't know. Does not apply.

96. Do you prefer working alone or with a group of people?
A= Always alone.
B= Usually alone.
C= No preference.
D= Usually with a group.
E= Always with a group.
F= I don't know.

97. Are you able to come up with unique or imaginative ways to solve problems between people or settle arguments?
A= Maybe once or twice.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

INTRAPERSONAL

98. Do you have a clear sense of who you are and what you want out of life?
A= Very little.
B= A little.
C= Usually.
D= Most of the time.
E= Almost all the time.
F= I don't know.

99. Are you aware of your feelings and able to control your moods?
A= Every once in a while.
B= Sometimes.
C= Most of the time.
D= Almost all the time.
E= Always.
F= I don't know.

100. Do you plan and work hard toward personal goals like at school, work or home?
A= Rarely.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know.

101. Do you "know your own mind" and do well at making important personal decisions such as choosing classes, changing jobs,moving?
A= No or every once in a while.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know.

102. Are you happy with the work you choose because it matches your skills, interests and personality?
A= No or rarely.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know.

103. Do you generally know what you are good at (or not good at) doing and try to improve your skills?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know.

104. Do you get very angry when you fail or are frustrated?
A= Almost all the time.
B= Sometimes.
C= Every once in a while.
D= Rarely.
E= Almost never.
F= I don't know.

105. Have you ever had interest in "self improvement"? For instance, do you attend classes to learn new skills or read "self-help" books or magazines?
A= No.
B= A little.
C= Sometimes.
D= Often.
E= Almost always.
F= I don't know.

106. Have you ever been able to find unique or unusual ways to solve personal problems or achieve your goals?
A= Once or twice.
B= Every once in a while.
C= Sometimes.
D= Often
E= All the time.
F= I don't know.

NATURALIST

107. **Have you ever raised pets or other animals?**
A= Never or rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

108. **Is it easy for you to understand and care for an animal?**
A= Not at all.
B= Maybe a little.
C= Fairly easy.
D= Quite easy.
E= Very easy.
F= I don't know.

109. **Have you ever done any pet training, hunting or studied wildlife?**
A= No.
B= A little.
C= Sometimes.
D= Quite a bit.
E= A great deal.
F= I don't know. No opportunity.

110. **Are you good at working with farm animals or thought about being a veterinarian or naturalist?**
A= Not at all.
B= A little.
C= Some.
D= Quite a bit.
E= Very much so.
F= I don't know.

111. **Do you easily understand differences betweeo animals such as personalities, traits or habits?**
A= Not at all.
B= A little.
C= Fairly easy.
D= Quite easy.
E= Very easy.
F= I don't know.

112. **Are you good at recognizing breeds of pets or kinds of animals?**
A= Not at all.
B= At little.
C= Somewhat.
D= Quite good.
E= Very good.
F= I don't know.

113. **Are you good at observing and learning about nature, for example, types of clouds, weather patterns, animal or plant life?**
A= Never.
B= A little.
C= Some.
D= Quite a bit.
E= A great deal.
F= I don't know.

114. **Are you good at growing plants or raisiug a garden?**
A= Not at all.
B= A little.
C= Somewhat.
D= Quite a bit.
E= Very good.
F= I don't know.

115. **Can you identify or understand the differences between types of plants?**
A= Not at all.
B= A little.
C= Somewhat.
D= Most of the time, yes.
E= All the time.
F= I don't know.

116. **Are you fascinated by natural energy systems such as chemistry, electricity, engines, physics or geology?**
A= No.
B= A little.
C= Somewhat.
D= Quite a bit.
E= A great deal.
F= I don't know.

117. **Do you have a concern for nature and do things like recyling, camping, hiking or bird watching?**
A= No.
B= A little
C= Some.
D= A lot.
E= A great deal.
F= I don't know.

118. **Have you takeu photographs of nature or written stories or done artwork?**
A= No.
B= A little.
C= Some.
D= A lot.
E= A great deal.
F= I don't know.

119. **Is spending time with nature an important part of your life?**
A= Not really.
B= A little.
C= Somewhat.
D= Quite a bit.
E= Very much so.
F= I don't know.

APPENDIX B

SAMPLE MIDAS PROFILE FOR PARTICIPANTS

MULTIPLE INTELLIGENCE DEVELOPMENTAL ASSESSMENT SCALES
MIDAS VERSION 2.0 PROCESSED 10-13-1998
for
Jane Doe

Sex: Female Grade: 13 Birth Date: 25
ID Number: White Code: jp9

The following Profile represents areas of strength and limitation as reported by you at this time. This is preliminary information to be confirmed by way of further discussion and exploration.

Scales	
Musical	**********
Kinesthetic	**********
Logical-Mathematical	**********
Spatial	**********
Linguistic	**********
Interpersonal	**********
Intrapersonal	**********
Naturalist	**********

The following Profile represents your intellectual style. These scales indicate if you tend to be more inventive, accurate or social in your problem solving abilities.

Scales	
Leadership	**********
General Logic	**********
Innovative	**********

Completed items: 99%

MIDAS Profile for Jane Doe ID: White

The MIDAS subscales are listed below from the highest to lowest. They are useful for identifying specific areas of skill that you describe as your strongest and weakest.

Specific Skill	Category
School Math	Logical-Mathematical
Everyday Problem-Solving	Logical-Mathematical
Written/Reading	Linguistic
Sensitivity	Interpersonal
Rhetorical	Linguistic
Spatial Awareness	Spatial
Science	Naturalist
Communication	Leadership
Social	Leadership
Animal Care	Naturalist
Expressive	Linguistic
Personal Knowledge	Intrapersonal
Calculations	Intrapersonal
Spatial Problem-Solving	Intrapersonal
Working with People	Interpersonal
Vocal	Musical
Effectiveness	Intrapersonal
Dexterity	Kinesthetic
Appreciation	Musical
Logic Games	Logical-Mathematical
Everyday Math	Logical-Mathematical
Persuasion	Interpersonal
Management	Leadership
Plant Care	Naturalist
Athletic	Kinesthetic
Art Design	Spatial
Working with Objects	Spatial
Instrument	Musical
Composer	Musical

MIDAS Profile for Jane Doe ID: White

The following are percentage scores based on the total number of completed items for the main scales and subscales. Approximate Category ranks are included to aid interpretation. Please refer to the current manual for interpretative information.

Clusters	Score	Score
Musical	68 High	
Appreciation		75 High
Instrument		50 Moderate
Vocal		81 Very High
Composer		38 Low
Kinesthetic	73 High	
Athletic		67 High
Dexterity		79 High
Logical-Mathematical	84 Very High	
School Math		100 Very High
Logic Games		75 High
Everyday Math		75 High
Everyday Problem-Solving		100 Very High
Spatial	72 High	
Spatial Awareness		90 Very High
Art Design		65 High
Working with Objects		56 Moderate
Linguistic	91 Very High	
Expressive		86 Very High
Rhetorical		91 Very High
Written/Reading		100 Very High
Interpersonal	74 High	
Persuasion		75 High
Sensitivity		92 Very High
Working with People		83 Very High
Intrapersonal	82 Very High	
Personal Knowledge		86 Very High
Calculations		85 Very High
Spatial Problem-Solving		85 Very High
Effectiveness		80 Very High
Naturalist	84 Very High	
Science		90 Very High
Animal Care		88 Very High
Plant Care		69 High
Leadership	83 Very High	
Communication		90 Very High
Management		90 High
Social		90 Very High

APPENDIX C

BRIEF LEARNING SUMMARY WORKSHEETS

The MIDAS

Brief Learning Summary

Verified

Name:_____ Date:_____ #_____

The following Profile was compiled from data provided by you. It represents areas of strength and limitation as described by you. This is preliminary information to be confirmed by way of discussion and further exploration.

	MAIN	SPECIFIC
HIGH		
MIDDLE		
LOW		

Preferred Activities:

Student's Reflection

on *Brief Learning Summary*

The areas on the Summary that I think are too high or low are:

	High	*OK*	*Low*		*High*	*OK*	*Low*
Linguistic	___	___	___	**Musical**	___	___	___
Spatial	___	___	___	**Kinesthetic**	___	___	___
Math / Logic	___	___	___	**Interpersonal**	___	___	___
Intrapersonal	___	___	___	**Naturalist**	___	___	___

Overall, I think the Profile is: **OK**_____ **Too high**_____ **Too Low**_____ **Mixed up** _____

My _____ scale **surprises** me because . . .

_____

_____

_____

My _____ scale **puzzles** me because . . .

_____

_____

_____

What I **learned** about myself by completing this assessment is . . .

_____

_____

_____

Other Comments:

_____

APPENDIX D

ORGANIZATIONAL MEMORANDA FOR THE STUDY

College of the Redwoods
Resource Development

MEMORANDUM

DATE: September 15, 1998

TO: Stacey Atkins, Lauren Gogan, Kitty Kuhn, Candice Ludlow, Anna Moore, Georgeann Wence

FROM: Mark Winter & Joyce Ksicinski

SUBJECT: A Research Project for GS 100/110

We are seeking the support and cooperation of GS 100/110 College Skills faculty for Joyce's dissertation research project involving Multiple Intelligences (MI). MI theory (Howard Gardner, Harvard University) refutes the concept of general intelligence and states that everyone has a unique composite of talents and abilities. Using an "intelligence fair" construct changes the question *"How smart are you?"* to *"How are you smart?"*

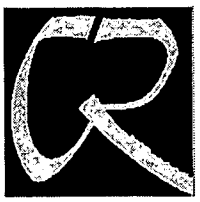
For the Spring term, we would like to substitute the current learning styles instruments (Chapter 1) with the Multiple Intelligence Developmental Assessment Scales (MIDAS). This survey engages the student in a self-discovery process and produces a profile that highlights individual strengths and weaknesses.

Joyce would administer the instrument in one class period. After a brief background, the students would be asked to complete a consent form that releases the info for use in her dissertation. The introduction should take 10 minutes; the instrument takes 30-35 minutes to complete. Joyce would collate the data, and prepare the individual student profiles for the faculty. Each instructor would decide how to use that information in follow-up activities.

We would like to meet with the GS 100/110 faculty in the next month to answer any questions and plan this research study for next semester. The estimated meeting time is 45 minutes. If you are interested and willing to participate, please complete the attached schedule indicating available meeting times and return to Mark Winter by September 23. If individual schedules present too many conflicts, more than one meeting or individual meetings will be arranged.

Your participation is entirely voluntary, but important for a statistically valid study. We believe that there is merit in this project that could benefit students and faculty by exploring alternative approaches that help remedial students' succeed. If you have any questions, feel free to call Mark at x4310 or Joyce at x4274. Thank you for your consideration.

C: Lea Mills
Enclosure: Blank schedule



College of the Redwoods
Resource Development

MEMORANDUM

DATE: October 1, 1998

TO: Stacey Atkins, Lauren Gogan, Kitty Kuhn, Candice Ludlow, Anna Moore, and Georgeann Wence

FROM: Mark Winter and Joyce Ksicinski

SUBJECT: Research Project for GS 100

Your response about participating in the research study is appreciated. After juggling schedules, we have set two meeting times to reach all of you. Friday afternoons were available for most, so we would like to schedule Friday, October 16, 3 pm in FM 107. A second meeting will be held on Monday, October 19 at 10 am in Joyce=s office, Admin 100.

In preparation for the meeting and to get an idea of the project, we are asking each of you to take the MIDAS instrument. Please return the completed instrument to **Joyce by Friday, October 9**. She will prepare your individual profiles which will be the basis of discussion at the scheduled meetings. Other issues such as when to administer the instrument will also be addressed.

Please call Joyce at 476-4274 to confirm which meeting you will attend, or return the response below with your completed MIDAS. Once again, thank you for supporting Joyce=s dissertation project. This is an important first step for a statistically valid study.

C: Lea Mills

Enclosure: MIDAS Questionnaire to be completed and returned to Joyce by 10/9/98.

For Instructors:

I will attend _____Friday, October 16, 3 pm meeting.

I will attend _____Monday, October 19, 10 am meeting.

College of the Redwoods
Resource Development
MEMORANDUM

DATE: October 15, 1998

TO: Stacey Atkins, Lauren Gogan, Kitty Kuhn, Candice Ludlow, Anna Moore, GeorgeAnn Wence, Mark Winter

FROM: Joyce Ksicinski, Resource Development Specialist

SUBJECT: MIDAS Planning Meeting Agenda

I. A Brief Description of Multiple Intelligences

II. Discussion of the MIDAS & the Profile

III. Logistics of the Study
- A. Relationship to Learning Styles
- B. Relationship to Course Content
- C. When to Administer MIDAS
- D. After Administration of MIDAS

IV. Open Discussion

APPENDIX E

CONSENT FORM FOR STUDY PARTICIPANTS WITH DEMOGRAPHIC QUESTIONS

MIDAS

(Multiple Intelligences Development Assessment Scales)
by C. Branton Shearer, Ph.D. 8 1994

Name_____

Give meeting days & time:
Psychology 1 Section_____
General Studies 100 College Skills Section_____

Sex_____

Age_____

Ethnicity: _____ African-American
_____ American Indian
_____ Asian/Pacific Islander
_____ Hispanic
_____ White
_____ Other (specify)_____

Please circle the answer to each question that best describes you. Since this is a self-discovery questionnaire, **there are no *right* or *wrong* answers**. You do not have to answer or guess every question, feel free to use the AI don=t know@ or ADoes not apply@ choice, if appropriate.

Try not to underrate or overrate yourself.
Be honest about who you are!

Consent to Release Information

The information from this MIDAS instrument may be used in the Multiple Intelligences dissertation project being conducted at College of the Redwoods. I understand that participation in the study is voluntary. Results will be confidential. We are asking for your name in order to return the data to you. Only the dissertation author, dissertation advisors, and your College Skills instructor will have access to this data.

Signature _____ Date _____

APPENDIX F

DISSAGREGATED DEMOGRAPHIC DATA OF THE STUDY POPULATION

DISSAGREGATED DEMOGRAPHIC DATA OF THE STUDY POPULATION
SAMPLE SORTED BY GENDER, AGE, AND ETHNCITY

cl6	f	18 B	cl18	m	17 W	cl16	m	19 A			
cl14	f	18 W	cl24	m	17 IH	jp9	m	19 A			
sa2	f	18	cl6	f	18 B	cl3	m	20 A			
sa3	f	18 W	cl14	f	18 W	sa11	m	20 A			
sa24	f	18 W	sa2	f	18	jp3	f	21 A			
cl22	f	19 W	sa3	f	18 W	jp14	f	22 A	Total females	46	
cl23	f	19 W	sa24	f	18 W	cl6	f	18 B	Total males	35	
cl25	f	19 W	cl2	m	18 W	sa20	m	18 B			
jp16	f	19 W	sa17	m	18 W	sa5	m	19 B	Total	81	
cl13	f	20 W	sa20	m	18 B	sa8	m	19 B			
cl19	f	20 W	jp10	m	18 H	cl8	m	21 B			
sa7	f	20 H	cl22	f	19 W	sta8	f	38 B			
sa22	f	20 H	cl23	f	19 W	sta5	m	50 B			
sta3	f	20 W	cl25	f	19 W	jp10	m	18 H			
sta10	f	20 W	jp16	f	19 W	sa7	f	20 H	19 or less	26	
jp3	f	21 A	cl12	m	19 I	sa22	f	20 H	20 - 24	28	
jp8	f	21 I	cl16	m	19 A	sa18	m	21 H	25 - 29	2	
sta11	f	21 W	sa1	M	19 W	sa19	f	24 H	30 - 34	9	
sta14	f	21 W	sa4	m	19 W	cl15	m	31 H	35 - 39	10	
sa10	f	22 W	sa5	m	19 B	cl21	f	37 H	40 - 49	4	
jp14	f	22 A	sa8	m	19 B	cl12	m	19 I	50 +	2	
cl11	f	24 W	sa12	m	19 W	jp8	f	21 I	Total	81	
sa19	f	24 H	sa23	m	19 W	cl9	f	35 I			
sta6	f	24 IW	jp9	m	19 A	jp15	f	35 I			
sta12	f	24 W	sta1	m	19 W	cl4	f	36 I			
jp6	f	27 W	sta13	m	19 W	cl24	m	17 I			
cl20	f	30 W	cl13	f	20 W	sta6	f	24 W			
sa15	f	30 W	cl19	f	20 W	cl18	m	17 W	Asian/Pacific (A)	6	
jp11	f	30 W	sa7	f	20 H	cl14	f	18 W	Black (B)	7	
sta4	f	30 W	sa22	f	20 H	sa3	f	18 W	Hispanic (H)	7	
cl7	f	32 W	sta3	f	20 W	sa24	f	18 W	American Indian (I)	6	
sa6	f	32 W	sta10	f	20 W	cl2	m	18 W	White (W)	54	
sa13	f	33 W	cl3	m	20 A	sa17	m	18 W	Unknown	1	
cl9	f	35 I	sa11	m	20 A	cl22	f	19 W			
jp15	f	35 I	jp18	m	20 W	cl23	f	19 W	Total	81	
cl4	f	36 I	jp19	m	20 W	cl25	f	19 W			
sa9	f	36 W	jp4	f	20 W	jp16	f	19 W			
sp17	f	36 W	jp3	f	21 A	sa1	M	19 W			
cl21	f	37 H	jp8	f	21 I	sa4	m	19 W			
jp2	f	37 W	sta11	f	21 W	sa12	m	19 W			
sta8	f	38 B	sta14	f	21 W	sa23	m	19 W			
cl1	f	44 W	cl8	m	21 B	sta1	m	19 W			
sta2	f	48 W	sa18	m	21 H	sta13	m	19 W			
jp1	f	51 W	sa21	m	21 W	cl13	f	20 W			
cl10	f	48 W	jp12	m	21 W	cl19	f	20 W			
jp4	f	20 W	sa10	f	22 W	sta3	f	20 W			
cl18	m	17 W	jp14	f	22 A	sta10	f	20 W			
cl24	m	17 IH	cl17	m	23 W	jp18	m	20 W			
cl2	m	18 W	cl11	f	24 W	jp19	m	20 W			

sa17	m	18 W	sa19	f	24 H	sta11	f	21 W
sa20	m	18 B	sta6	f	24 IW	sta14	f	21 W
jp10	m	18 H	sta12	f	24 W	sa21	m	21 W
cl12	m	19 I	cl5	m	24 W	jp12	m	21 W
cl16	m	19 A	sta9	m	24 W	sa10	f	22 W
sa1	M	19 W	jp6	f	27 W	cl17	m	23 W
sa4	m	19 W	sa16	m	27 W	cl11	f	24 W
sa5	m	19 B	cl20	f	30 W	sta12	f	24 W
sa8	m	19 B	sa15	f	30 W	cl5	m	24 W
sa12	m	19 W	jp11	f	30 W	sta9	m	24 W
sa23	m	19 W	sta4	f	30 W	jp6	f	27 W
jp9	m	19 A	cl15	m	31 H	sa16	m	27 W
sta1	m	19 W	cl7	f	32 W	cl20	f	30 W
sta13	m	19 W	sa6	f	32 W	sa15	f	30 W
cl3	m	20 A	sa13	f	33 W	jp11	f	30 W
sa11	m	20 A	jp7	m	33 W	sta4	f	30 W
jp18	m	20 W	cl9	f	35 I	cl7	f	32 W
jp19	m	20 W	jp15	f	35 I	sa6	f	32 W
cl8	m	21 B	cl4	f	36 I	sa13	f	33 W
sa18	m	21 H	sa9	f	36 W	jp7	m	33 W
sa21	m	21 W	sp17	f	36 W	sa9	f	36 W
jp12	m	21 W	sta7	m	36 W	sp17	f	36 W
cl17	m	23 W	cl21	f	37 H	sta7	m	36 W
cl5	m	24 W	jp2	f	37 W	jp2	f	37 W
sta9	m	24 W	sta8	f	38 B	sa14	m	38 W
sa16	m	27 W	sa14	m	38 W	cl1	f	44 W
cl15	m	31 H	cl1	f	44 W	jp13	m	47 W
jp7	m	33 W	jp13	m	47 W	sta2	f	48 W
sta7	m	36 W	sta2	f	48 W	jp1	f	51 W
sa14	m	38 W	cl10	f	48 W	cl10	f	48 W
jp13	m	47 W	sta5	m	50 B	jp4	f	20 W
sta5	m	50 B	jp1	f	51 W	sa2	f	18

APPENDIX G

MAJOR AND INTELLECTUAL STYLE MI SCALE DATA OF THE STUDY POPULATION

MAJOR AND INTELLECTUAL STYLE MI SCALE DATA
MEAN SCORES OF THE STUDY POPULATION

			Mus	Kin	Math	Spat	Ling	Inter	Intra	Nat	Lead	Gen	Inno
sa6	f	32 W	0.08	0.06	0.23	0.23	0.22	0.67	0.43	0.42	0.43	0.39	0.21
cl1	f	44 W	0.09	0.56	0.37	0.55	0.2	0.35	0.39	0.69	0.39	0.47	0.41
sta10	f	20 W	0.18	0.44	0.35	0.59	0.4	0.57	0.4	0.44	0.57	0.49	0.6
sta14	f	21 W	0.23	0.38	0.7	0.63	0.74	0.43	0.6	0.47	0.63	0.54	0.57
sta8	f	38 B	0.27	0.4	0.53	0.64	0.65	0.59	0.62	0.25	0.58	0.67	0.58
sa10	f	22 W	0.27	0.39	0.35	0.33	0.25	0.67	0.38	0.48	0.31	0.35	0.26
cl10	f	48 W	0.29	0.44	0.36	0.17	0.47	0.49	0.44	0.59	0.49	0.35	0.26
cl4	f	36 I	0.29	0.35	0.53	0.75	0.53	0.82	0.73	0.73	0.75	0.71	0.49
cl20	f	30 W	0.31	0.48	0.44	0.56	0.37	0.51	0.43	0.48	0.46	0.44	0.49
jp16	f	19 W	0.32	0.4	0.36	0.64	0.36	0.67	0.39	0.44	0.44	0.41	0.54
cl14	f	18 W	0.38	0.19	0.34	0.41	0.5	0.58	0.32	0.2	0.47	0.29	0.46
cl6	f	18 B	0.39	0.19	0.51	0.68	0.4	0.51	0.48	0.36	0.53	0.58	0.5
jp14	f	22 A	0.39	0.52	0.38	0.33	0.69	0.67	0.56	0.19	0.62	0.62	0.43
sa13	f	33 W	0.39	0.31	0.21	0.39	0.16	0.67	0.31	0.2	0.4	0.35	0.21
cl13	f	20 W	0.42	0.38	0.66	0.5	0.63	0.87	0.69	0.58	0.75	0.72	0.53
sa9	f	36 W	0.43	0.48	0.45	0.81	0.53	0.67	0.51	0.67	0.75	0.69	0.65
sta2	f	48 W	0.45	0.33	0.71	0.66	0.67	0.63	0.64	0.66	0.61	0.6	0.63
sa2	f	18	0.46	0.5	0.58	0.6	0.46	0.67	0.53	0.72	0.54	0.58	0.55
sa3	f	18 W	0.46	0.43	0.31	0.41	0.67	0.67	0.35	0.34	0.58	0.41	0.59
jp2	f	37 W	0.46	0.36	0.72	0.47	0.44	0.67	0.66	0.17	0.61	0.73	0.42
sp17	f	36 W	0.48	0.48	0.3	0.5	0.53	0.67	0.47	0.52	0.51	0.48	0.51
cl25	f	19 W	0.5	0.29	0.74	0.64	0.55	0.67	0.69	0.7	0.54	0.69	0.53
sta11	f	21 W	0.5	0.21	0.32	0.38	0.55	0.5	0.47	0.53	0.5	0.49	0.37
cl7	f	32 W	0.5	0.31	0.49	0.42	0.41	0.38	0.39	0.56	0.46	0.45	0.43
sa22	f	20 H	0.52	0.77	0.25	0.61	0.46	0.67	0.45	0.33	0.54	0.39	0.56
jp6	f	27 W	0.52	0.35	0.41	0.36	0.37	0.67	0.4	0.44	0.32	0.41	0.33
sa24	f	18 W	0.52	0.46	0.88	0.86	0.62	0.67	0.72	0.73	0.67	0.78	0.82
jp8	f	21 I	0.54	0.73	0.58	0.48	0.71	0.67	0.72	0.52	0.75	0.74	0.54
cl19	f	20 W	0.57	0.35	0.34	0.25	0.78	0.55	0.4	0.68	0.7	0.45	0.52
cl22	f	19 W	0.59	0.69	0.55	0.66	0.62	0.82	0.57	0.45	0.65	0.63	0.72
sa7	f	20 H	0.59	0.4	0.38	0.53	0.47	0.67	0.52	0.28	0.54	0.5	0.43
sta6	f	24 IW	0.59	0.5	0.71	0.61	0.79	0.74	0.67	0.62	0.75	0.65	0.65
sta4	f	30 W	0.59	0.5	0.74	0.72	0.62	0.57	0.63	0.5	0.64	0.65	0.69
jp1	f	51 W	0.61	0.43	0.53	0.52	0.35	0.67	0.52	0.6	0.6	0.5	0.35
jp4	f	20 W	0.63	0.42	0.6	0.33	0.68	0.67	0.6	0.72	0.71	0.56	0.64
cl23	f	19 W	0.64	0.75	0.76	0.77	0.62	0.74	0.76	0.67	0.64	0.83	0.69
jp3	f	21 A	0.66	0.42	0.44	0.41	0.41	0.67	0.43	0.45	0.5	0.49	0.43
cl9	f	35 I	0.66	0.42	0.38	0.63	0.47	0.79	0.46	0.25	0.63	0.59	0.54
cl21	f	37 H	0.68	0.73	0.83	0.94	0.82	0.93	0.94	0.88	0.92	0.91	0.94
sa19	f	24 H	0.75	0.56	0.66	0.63	0.83	0.67	0.67	0.8	0.74	0.73	0.65
sa15	f	30 W	0.77	0.77	0.64	0.78	0.88	0.67	0.7	0.77	0.89	0.79	0.81
cl11	f	24 W	0.79	0.4	0.39	0.43	0.46	0.42	0.47	0.58	0.47	0.41	0.51
sta12	f	24 W	0.82	0.27	0.64	0.52	0.58	0.5	0.6	0.63	0.54	0.54	0.45
jp15	f	35 I	0.82	0.52	0.61	0.69	0.79	0.67	0.63	0.83	0.92	0.65	0.83
sta3	f	20 W	0.88	0.23	0.18	0.41	0.75	0.63	0.44	0.17	0.67	0.42	0.57
jp11	f	30 W	0.88	0.65	0.59	0.92	0.74	0.67	0.66	0.67	0.72	0.7	0.78
sta1	m	19 W	0.04	0.58	0.43	0.53	0.32	0.55	0.43	0.42	0.42	0.46	0.25

jp13	m	47	W	0.1	0.08	0.11	0.27	0.22	0.67	0.3	0.17	0.28	0.3	0.06
sa8	m	19	B	0.1	0.55	0.06	0.17	0.28	0.67	0.32	0.06	0.35	0.26	0.25
sa21	m	21	W	0.19	0.1	0.58	0.47	0.42	0.67	0.62	0.31	0.42	0.63	0.25
sa23	m	19	W	0.21	0.63	0.34	0.53	0.32	0.67	0.38	0.3	0.47	0.45	0.31
sa16	m	27	W	0.23	0.39	0.35	0.44	0.32	0.67	0.48	0.58	0.38	0.41	0.25
cl12	m	19	I	0.23	0.65	0.45	0.61	0.58	0.76	0.63	0.63	0.78	0.65	0.58
cl15	m	31	H	0.23	0.43	0.36	0.47	0.26	0.03	0.21	0.06	0.11	0.23	0.27
jp19	m	20	W	0.29	0.4	0.73	0.67	0.46	0.67	0.62	0.5	0.5	0.61	0.54
cl2	m	18	W	0.3	0.67	0.28	0.34	0.43	0.45	0.26	0.36	0.38	0.31	0.35
sa18	m	21	H	0.31	0.48	0.76	0.63	0.24	0.67	0.68	0.65	0.43	0.7	0.4
cl16	m	19	A	0.35	0.44	0.45	0.42	0.25	0.38	0.48	0.25	0.28	0.41	0.28
sa5	m	19	B	0.35	0.45	0.2	0.46	0.22	0.67	0.28	0.25	0.41	0.25	0.44
cl24	m	17	IH	0.36	0.21	0.25	0.22	0.38	0.67	0.39	0.5	0.57	0.46	0.28
jp9	m	19	A	0.38	0.6	0.48	0.55	0.2	0.67	0.43	0.22	0.33	0.36	0.34
jp7	m	33	W	0.38	0.55	0.49	0.55	0.44	0.67	0.55	0.57	0.5	0.55	0.52
sta5	m	50	B	0.39	0.4	0.49	0.61	0.33	0.26	0.52	0.61	0.33	0.43	0.31
sa1	M	19	W	0.41	0.9	0.66	0.59	0.65	0.67	0.62	0.67	0.65	0.59	0.51
jp12	m	21	W	0.43	0.69	0.55	0.47	0.51	0.67	0.58	0.42	0.43	0.59	0.47
sa11	m	20	A	0.43	0.73	0.38	0.56	0.43	0.67	0.43	0.19	0.47	0.48	0.5
sa17	m	18	W	0.45	0.46	0.66	0.48	0.26	0.67	0.52	0.39	0.38	0.5	0.33
sta7	m	36	W	0.45	0.48	0.3	0.42	0.58	0.29	0.42	0.3	0.36	0.35	0.51
jp10	m	18	H	0.48	0.6	0.41	0.38	0.43	0.67	0.57	0.47	0.64	0.59	0.47
sa4	m	19	W	0.48	0.59	0.64	0.68	0.3	0.67	0.57	0.8	0.67	0.59	0.54
cl17	m	23	W	0.56	0.5	0.59	0.67	0.71	0.86	0.69	0.34	0.81	0.71	0.67
cl8	m	21	B	0.57	0.65	0.38	0.47	0.42	0.51	0.61	0.42	0.58	0.5	0.35
sta13	m	19	W	0.59	0.46	0.51	0.75	0.67	0.63	0.55	0.77	0.56	0.63	0.57
sa12	m	19	W	0.63	0.58	0.69	0.69	0.66	0.67	0.64	0.84	0.69	0.66	0.58
sa14	m	38	W	0.64	0.19	0.4	0.41	0.42	0.67	0.46	0.11	0.49	0.53	0.33
cl3	m	20	A	0.65	0.69	0.6	0.52	0.54	0.53	0.56	0.58	0.5	0.59	0.58
cl18	m	17	W	0.7	0.83	0.63	0.75	0.67	0.79	0.72	0.8	0.82	0.74	0.76
jp18	m	20	W	0.7	0.67	0.51	0.61	0.55	0.67	0.6	0.77	0.51	0.54	0.51
sta9	m	24	W	0.73	0.77	0.66	0.73	0.86	0.87	0.77	0.35	0.89	0.74	0.77
sa20	m	18	B	0.73	0.69	0.43	0.61	0.66	0.67	0.65	0.47	0.68	0.69	0.69
cl5	m	24	W	0.82	0.6	0.6	0.67	0.58	0.87	0.7	0.75	0.72	0.71	0.63

APPENDIX H

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY GENDER

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY GENDER

Musical	All	Female	Male
Mean	0.47	0.5	0.43
Standard Error	0.02	0.03	0.03
Median	0.46	0.5	0.41
Mode	0.59	0.59	0.38
Standard Deviation	0.2	0.2	0.2
Sample Variance	0.04	0.04	0.04
Kurtosis	-0.5	-0.3	-0.7
Skewness	-0	-0.1	0.09
Range	0.83	0.8	0.78
Minimum	0.04	0.08	0.04
Maximum	0.88	0.88	0.82
Sum	38	23.1	14.9
Count	81	46	35
Confidence Level(95.0%)	0.04	0.06	0.07
Z=1.56			

Linguistic	All	Female	Male
Mean	0.5	0.55	0.44
Standard Error	0.02	0.03	0.03
Median	0.47	0.54	0.43
Mode	0.62	0.62	0.32
Standard Deviation	0.18	0.18	0.17
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.9	-0.6	-0.7
Skewness	0.09	-0.2	0.43
Range	0.72	0.72	0.66
Minimum	0.16	0.16	0.2
Maximum	0.88	0.88	0.86
Sum	40.7	25.2	15.6
Count	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06
Z=2.81			

Kinesthetic	All	Female	Male
Mean	0.48	0.44	0.53
Standard Error	0.02	0.02	0.03
Median	0.46	0.42	0.58
Mode	0.4	0.4	0.6
Standard Deviation	0.18	0.16	0.19
Sample Variance	0.03	0.03	0.04
Kurtosis	-0.2	0.22	0.54
Skewness	-0.1	0.34	-0.7
Range	0.83	0.71	0.81
Minimum	0.06	0.06	0.08
Maximum	0.9	0.77	0.9
Sum	38.9	20.2	18.7
Count	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06
z = 2.26			

Interpersonal	All	Female	Male
Mean	0.63	0.64	0.62
Standard Error	0.02	0.02	0.03
Median	0.67	0.67	0.67
Mode	0.67	0.67	0.67
Standard Deviation	0.14	0.12	0.17
Sample Variance	0.02	0.01	0.03
Kurtosis	3.93	0.77	3.99
Skewness	-1.4	-0.3	-1.7
Range	0.91	0.58	0.84
Minimum	0.03	0.35	0.03
Maximum	0.93	0.93	0.87
Sum	51.2	29.3	21.9
Count	81	46	35
Confidence Level(95.0%)	0.03	0.03	0.06
Z=.59			

Mathematical	All	Female	Male
Mean	0.49	0.5	0.47
Standard Error	0.02	0.03	0.03
Median	0.49	0.5	0.48
Mode	0.38	0.35	0.66
Standard Deviation	0.17	0.18	0.17
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.6	-0.9	-0.2
Skewness	-0	0.18	-0.4
Range	0.81	0.7	0.7
Minimum	0.06	0.18	0.06
Maximum	0.88	0.88	0.76
Sum	39.4	23	16.4
Count	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06
Z=.77			

Intrapersonal	All	Female	Male
Mean	0.53	0.54	0.52
Standard Error	0.02	0.02	0.02
Median	0.53	0.52	0.55
Mode	0.43	0.43	0.62
Standard Deviation	0.14	0.14	0.14
Sample Variance	0.02	0.02	0.02
Kurtosis	-0.2	-0.1	-0.5
Skewness	0.07	0.48	-0.5
Range	0.73	0.63	0.56
Minimum	0.21	0.31	0.21
Maximum	0.94	0.94	0.77
Sum	43.1	24.8	18.2
Count	81	46	35
Confidence Level(95.0%)	0.03	0.04	0.05
Z=.64			

Spatial	All	Female	Male
Mean	0.54	0.55	0.53
Standard Error	0.02	0.03	0.02
Median	0.55	0.56	0.53
Mode	0.61	0.63	0.61
Standard Deviation	0.16	0.18	0.14
Sample Variance	0.03	0.03	0.02
Kurtosis	-0.1	-0.3	0.04
Skewness	-0	0.1	-0.5
Range	0.77	0.77	0.58
Minimum	0.17	0.17	0.17
Maximum	0.94	0.94	0.75
Sum	43.7	25.3	18.4
Count	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.05

z = .57

Naturalist	All	Female	Male
Mean	0.49	0.52	0.45
Standard Error	0.02	0.03	0.04
Median	0.5	0.52	0.42
Mode	0.25	0.44	0.42
Standard Deviation	0.21	0.19	0.22
Sample Variance	0.04	0.04	0.05
Kurtosis	-0.9	-0.8	-0.9
Skewness	-0.2	-0.3	0.05
Range	0.81	0.71	0.78
Minimum	0.06	0.17	0.06
Maximum	0.88	0.88	0.84
Sum	39.8	24	15.9
Count	81	46	35
Confidence Level(95.0%)	0.05	0.06	0.08

z = 1.50

APPENDIX I

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY AGE

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY AGE

Musical	All	19 or less	20 - 24	25 or more
Mean	0.47	0.42	0.54	0.44
Standard Error	0.02	0.03	0.04	0.04
Median	0.46	0.43	0.56	0.45
Mode	0.59	0.48	0.59	0.39
Standard Deviation	0.2	0.17	0.2	0.22
Sample Variance	0.04	0.03	0.04	0.05
Kurtosis	-0.6	0.08	-0.9	-0.5
Skewness	-0	-0.3	-0.2	0.16
Range	0.83	0.69	0.7	0.8
Minimum	0.04	0.04	0.18	0.08
Maximum	0.88	0.73	0.88	0.88
Sum	37.5	11	15	12
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.07	0.08	0.09

Linguistic	All	19 or less	20 - 24	25 or more
Mean	0.5	0.46	0.57	0.47
Standard Error	0.02	0.03	0.03	0.04
Median	0.49	0.45	0.55	0.44
Mode	0.62	0.62	0.46	0.53
Standard Deviation	0.18	0.16	0.17	0.2
Sample Variance	0.03	0.03	0.03	0.04
Kurtosis	-0.9	-1.5	-0.7	-0.5
Skewness	0.08	-0.1	-0.1	0.41
Range	0.72	0.47	0.62	0.72
Minimum	0.16	0.2	0.24	0.16
Maximum	0.88	0.67	0.86	0.88
Sum	40.3	12.1	15.9	12.8
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.07	0.06	0.08

Kinesthetic	All	19 or less	20 - 24	25 or more
Mean	0.48	0.53	0.49	0.42
Standard Error	0.02	0.04	0.03	0.03
Median	0.48	0.56	0.46	0.43
Mode	0.4	0.46	0.4	0.48
Standard Deviation	0.18	0.18	0.18	0.16
Sample Variance	0.03	0.03	0.03	0.03
Kurtosis	-0.2	-0.1	-0.7	0.94
Skewness	-0.1	-0.2	-0.1	-0.2
Range	0.83	0.71	0.67	0.71
Minimum	0.06	0.19	0.1	0.06
Maximum	0.9	0.9	0.77	0.77
Sum	38.4	13.8	13.6	11.5
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.07	0.07	0.06

Interpersonal	All	19 or less	20 - 24	25 or more
Mean	0.63	0.65	0.65	0.59
Standard Error	0.02	0.02	0.02	0.04
Median	0.67	0.67	0.67	0.67
Mode	0.67	0.67	0.67	0.67
Standard Deviation	0.14	0.09	0.12	0.19
Sample Variance	0.02	0.01	0.01	0.04
Kurtosis	3.84	2.53	-0.1	2.16
Skewness	-1.3	-1.2	0.1	-1.3
Range	0.91	0.44	0.45	0.91
Minimum	0.03	0.38	0.42	0.03
Maximum	0.93	0.82	0.87	0.93
Sum	50.5	16.9	18.2	16
Count	80	26	28	27
Confidence Level(95.0%)	0.03	0.04	0.05	0.06

Mathematical	All	19 or less	20 - 24	25 or more
Mean	0.48	0.48	0.51	0.46
Standard Error	0.02	0.04	0.03	0.03
Median	0.48	0.46	0.56	0.45
Mode	0.38	0.51	0.38	0.49
Standard Deviation	0.17	0.19	0.16	0.17
Sample Variance	0.03	0.04	0.03	0.03
Kurtosis	-0.6	-0.3	-1.1	-0.2
Skewness	-0	-0	-0.3	0.19
Range	0.81	0.81	0.59	0.71
Minimum	0.06	0.06	0.18	0.11
Maximum	0.88	0.88	0.76	0.83
Sum	38.8	12.8	14.2	12.5
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.08	0.06	0.07

Intrapersonal	All	19 or less	20 - 24	25 or more
Mean	0.53	0.51	0.57	0.51
Standard Error	0.02	0.03	0.02	0.03
Median	0.54	0.53	0.6	0.48
Mode	0.43	#N/A	0.6	0.43
Standard Deviation	0.14	0.15	0.11	0.15
Sample Variance	0.02	0.02	0.01	0.02
Kurtosis	-0.3	-1.1	-1.1	0.95
Skewness	0.07	-0	-0.2	0.57
Range	0.73	0.5	0.39	0.73
Minimum	0.21	0.26	0.38	0.21
Maximum	0.94	0.76	0.77	0.94
Sum	42.5	13.2	15.9	13.9
Count	80	26	28	27
Confidence Level(95.0%)	0.03	0.06	0.04	0.06

Spatial	All	19 or less	20 - 24	25 or more
Mean	0.54	0.56	0.51	0.55
Standard Error	0.02	0.03	0.02	0.04
Median	0.54	0.6	0.52	0.55
Mode	0.61	0.75	0.61	0.47
Standard Deviation	0.17	0.17	0.13	0.2
Sample Variance	0.03	0.03	0.02	0.04
Kurtosis	-0.1	-0	-0.7	-0.3
Skewness	-0	-0.5	-0.3	0.15
Range	0.77	0.69	0.48	0.77
Minimum	0.17	0.17	0.25	0.17
Maximum	0.94	0.86	0.73	0.94
Sum	43.1	14.4	14.4	14.9
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.07	0.05	0.08

Naturalist	All	19 or less	20 - 24	25 or more
Mean	0.49	0.49	0.49	0.49
Standard Error	0.02	0.04	0.03	0.04
Median	0.49	0.46	0.49	0.56
Mode	0.25	0.8	0.58	0.67
Standard Deviation	0.21	0.22	0.18	0.23
Sample Variance	0.04	0.05	0.03	0.05
Kurtosis	-0.9	-1.1	-0.8	-0.9
Skewness	-0.2	-0	-0.1	-0.4
Range	0.81	0.78	0.63	0.81
Minimum	0.06	0.06	0.17	0.06
Maximum	0.88	0.84	0.8	0.88
Sum	39.1	12.8	13.7	13.3
Count	80	26	28	27
Confidence Level(95.0%)	0.05	0.09	0.07	0.09

APPENDIX J

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY ETHNICITY

DESCRIPTIVE STATISTICS FOR MAJOR MI SCALES OF THE STUDY POPULATION BY ETHNICITY

Musical	All	Minority	White
Mean	0.47	0.47	0.47
Standard Error	0.02	0.04	0.03
Median	0.46	0.43	0.46
Mode	0.59	0.39	0.45
Standard Deviation	0.2	0.18	0.21
Sample Variance	0.04	0.03	0.04
Kurtosis	-0.6	-0.8	-0.5
Skewness	-0	0.09	-0
Range	0.83	0.72	0.83
Minimum	0.04	0.1	0.04
Maximum	0.88	0.82	0.88
Sum	37.5	12.7	24.8
Count	80	27	53
Confidence Level(95.0%)	0.04	0.07	0.06

Linguistic	All	Minority	White
Mean	0.5	0.49	0.51
Standard Error	0.02	0.04	0.02
Median	0.49	0.46	0.53
Mode	0.62	0.47	0.62
Standard Deviation	0.18	0.2	0.18
Sample Variance	0.03	0.04	0.03
Kurtosis	-0.9	-1	-0.7
Skewness	0.08	0.29	-0
Range	0.72	0.63	0.72
Minimum	0.16	0.2	0.16
Maximum	0.88	0.83	0.88
Sum	40.3	13.2	27
Count	80	27	53
Confidence Level(95.0%)	0.04	0.08	0.05

Kinesthetic	All	Minority	White
Mean	0.48	0.52	0.46
Standard Error	0.02	0.03	0.03
Median	0.46	0.52	0.44
Mode	0.4	0.73	0.48
Standard Deviation	0.18	0.15	0.19
Sample Variance	0.03	0.02	0.04
Kurtosis	-0.2	-0.4	-0.1
Skewness	-0.1	-0.3	0.11
Range	0.83	0.58	0.83
Minimum	0.06	0.19	0.06
Maximum	0.9	0.77	0.9
Sum	38.4	14.1	24.3
Count	80	27	53
Confidence Level(95.0%)	0.04	0.06	0.05

Interpersonal	All	Minority	White
Mean	0.63	0.63	0.63
Standard Error	0.02	0.03	0.02
Median	0.67	0.67	0.67
Mode	0.67	0.67	0.67
Standard Deviation	0.14	0.18	0.12
Sample Variance	0.02	0.03	0.02
Kurtosis	3.84	4.78	0.85
Skewness	-1.3	-1.8	-0.6
Range	0.91	0.91	0.58
Minimum	0.03	0.03	0.29
Maximum	0.93	0.93	0.87
Sum	50.5	16.9	33.6
Count	80	27	53
Confidence Level(95.0%)	0.03	0.07	0.03

Mathematical	All	Minority	White
Mean	0.48	0.46	0.5
Standard Error	0.02	0.03	0.02
Median	0.48	0.45	0.51
Mode	0.38	0.38	0.35
Standard Deviation	0.17	0.17	0.18
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.6	0.37	-0.9
Skewness	-0	0.03	-0.1
Range	0.81	0.76	0.76
Minimum	0.06	0.06	0.11
Maximum	0.88	0.83	0.88
Sum	38.8	12.4	26.3
Count	80	27	53
Confidence Level(95.0%)	0.04	0.07	0.05

Intrapersonal	All	Minority	White
Mean	0.53	0.54	0.53
Standard Error	0.02	0.03	0.02
Median	0.54	0.56	0.52
Mode	0.43	0.43	0.43
Standard Deviation	0.14	0.16	0.13
Sample Variance	0.02	0.02	0.02
Kurtosis	-0.3	0.66	-1.1
Skewness	0.07	0.13	-0
Range	0.73	0.73	0.51
Minimum	0.21	0.21	0.26
Maximum	0.94	0.94	0.77
Sum	42.5	14.6	27.9
Count	80	27	53
Confidence Level(95.0%)	0.03	0.06	0.04

Spatial	All	Minority	White
Mean	0.54	0.54	0.54
Standard Error	0.02	0.03	0.02
Median	0.54	0.56	0.53
Mode	0.61	0.61	0.41
Standard Deviation	0.17	0.16	0.17
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.1	1.15	-0.5
Skewness	-0	-0.2	0.05
Range	0.77	0.77	0.75
Minimum	0.17	0.17	0.17
Maximum	0.94	0.94	0.92
Sum	43.1	14.6	28.5
Count	80	27	53
Confidence Level(95.0%)	0.04	0.06	0.05

Naturalist	All	Minority	White
Mean	0.49	0.44	0.51
Standard Error	0.02	0.04	0.03
Median	0.49	0.45	0.52
Mode	0.25	0.25	0.67
Standard Deviation	0.21	0.23	0.19
Sample Variance	0.04	0.05	0.04
Kurtosis	-0.9	-0.9	-0.8
Skewness	-0.2	0.23	-0.3
Range	0.81	0.81	0.74
Minimum	0.06	0.06	0.11
Maximum	0.88	0.88	0.84
Sum	39.1	11.8	27.3
Count	80	27	53
Confidence Level(95.0%)	0.05	0.09	0.05

APPENDIX K

MEAN SCORES FOR MAJOR MI SCALES OF THE STUDY POPULATION WITH SUBSCALES

MEAN SCORES FOR MAJOR MI SCALES OF THE STUDY POPULATION WITH SUBSCALES

	Mus	App	Inst	Voc	Comp	Kin	Athl	Dex	Math	Scho	Logic	Even	PS	Spat	Spatv	ArtD	W/Obj	Ling	Exp	Rhet	W/R	Inter	Pers	Sens	W/Peop	Intra	Pers	Calc	Spatl	Effect	Nat	Sci	Anim	Plant
cl1	0.09	0.13	0.13	0	0	0.56	0.5	0.67	0.37	0.08	0.33	0.15	0.58	0.55	0.5	0.6	0.5	0.2	0.18	0.17	0.38	0.35	0.25	0.42	0.5	0.39	0.64	0.05	0.45	0.31	0.69	0.7	0.71	0.56
cl4	0.29	0.5	0.13	0	0.25	0.35	0.54	0.17	0.53	0.17	0.81	0.6	0.33	0.75	1	0.45	0.81	0.53	0.5	0.47	0.69	0.82	0.67	0.86	0.58	0.73	1	0.45	0.9	0.8	0.73	0.7	0.67	0.81
cl6	0.39	0.46	0.25	0.42	0.25	0.19	0.08	0.29	0.51	0.42	0.63	0.55	0.42	0.68	0.56	0.7	0.67	0.4	0.43	0.25	0.83	0.51	0.42	0.58	0.42	0.48	0.5	0.5	0.56	0.31	0.38	0.5	0.21	0.38
cl7	0.5	0.71	0.5	0.38	0.13	0.31	0.25	0.38	0.49	0.33	0.31	0.6	0.75	0.42	0.15	0.7	0.31	0.41	0.21	0.5	0.56	0.38	0.42	0.46	0.5	0.39	0.68	0.35	0.1	0.4	0.56	0.5	0.63	0.63
cl9	0.66	0.79	0.5	0.5	0.75	0.42	0.42	0.42	0.38	0.38	0.44	0.35	0.42	0.63	0.5	0.7	0.75	0.47	0.43	0.5	0.5	0.79	0.75	0.89	0.67	0.46	0.43	0.3	0.4	0.7	0.26	0.2	0.25	0.31
cl10	0.29	0.54	0.13	0.08	0.13	0.44	0.63	0.26	0.36	0.33	0.13	0.2	0.42	0.17	0.3	0.05	0.13	0.47	0.48	0.38	0.69	0.49	0.25	0.64	0.83	0.44	0.61	0.35	0.2	0.55	0.59	0.66	0.79	0.19
cl11	0.79	0.75	0.88	0.75	0.88	0.4	0.21	0.58	0.39	0.17	0.38	0.3	0.42	0.43	0.75	0.25	0.44	0.48	0.5	0.38	0.56	0.42	0.42	0.46	0.58	0.47	0.57	0.2	0.75	0.5	0.58	0.6	0.5	0.44
cl13	0.42	0.75	0	0.25	0.13	0.38	0.17	0.58	0.66	0.83	0.75	0.55	0.58	0.5	0.5	0.13	0.75	0.63	0.54	0.75	0.56	0.67	0.83	0.82	0.92	0.69	0.82	0.65	0.65	0.75	0.58	0.6	0.67	0.38
cl14	0.38	0.5	0.13	0.25	0.38	0.19	0.08	0.29	0.34	0.58	0.13	0.31	0.58	0.41	0.15	0.7	0.25	0.5	0.54	0.44	0.58	0.58	0.5	0.43	0.67	0.32	0.29	0.38	0.15	0.6	0.2	0.06	0.33	0.19
cl19	0.57	0.75	0.38	0.25	0.88	0.35	0.38	0.33	0.34	0.08	0.33	0.08	0.58	0.25	0.25	0.31	0.33	0.78	0.79	0.78	0.75	0.55	0.58	0.57	0.38	0.4	0.35	0.08	0.17	0.6	0.68	0.56	0.75	0.58
cl20	0.31	0.46	0.13	0.13	0.25	0.48	0.58	0.38	0.44	0.42	0.38	0.35	0.58	0.56	0.5	0.7	0.44	0.37	0.38	0.38	0.38	0.51	0.5	0.46	0.67	0.43	0.54	0.3	0.4	0.45	0.48	0.4	0.42	0.63
cl21	0.66	0.92	0.38	0.38	0.88	0.73	0.63	0.63	0.63	0.83	0.75	0.8	1	0.94	1	0.96	0.88	0.82	0.88	0.94	0.81	0.93	0.92	1	0.83	0.94	1	0.8	1	0.95	0.88	0.9	0.92	0.75
cl22	0.59	0.79	0.13	0.5	0.63	0.69	0.79	0.58	0.55	0.25	0.31	0.7	0.67	0.66	0.45	0.85	0.56	0.62	0.61	0.56	0.75	0.82	0.92	0.89	0.42	0.57	0.79	0.45	0.35	0.7	0.45	0.55	0.54	0.25
cl23	0.64	0.83	0.75	0.75	0.38	0.75	0.63	0.67	0.76	0.75	0.81	0.75	0.75	0.77	0.65	1	0.63	0.62	0.54	0.56	0.68	0.74	0.5	0.86	0.42	0.78	0.82	0.6	0.7	0.8	0.67	0.5	0.83	0.69
cl25	0.5	0.67	0.13	0.63	0.13	0.29	0.08	0.5	0.74	0.83	0.63	0.7	0.83	0.64	0.7	0.7	0.56	0.55	0.5	0.67	0.5	0.67	0.67	0.32	0.42	0.69	0.79	0.85	0.55	0.6	0.7	0.65	0.92	0.63
sa2	0.46	0.71	0.13	0.42	0.13	0.5	0.54	0.45	0.58	0.58	0.33	0.42	0.88	0.6	0.6	0.58	0.63	0.46	0.36	0.67	0.38	0.67	0.67	0.63	0.67	0.53	0.5	0.44	0.6	0.6	0.72	0.65	0.75	0.67
sa3	0.46	0.63	0.25	0.25	0.75	0.43	0.42	0.45	0.31	0	0.19	0.15	1	0.41	0.35	0.5	0.25	0.67	0.54	0.67	0.88	0.67	0.67	0.54	0.67	0.35	0.57	0.05	0.2	0.55	0.34	0.4	0.21	0.31
sa6	0.08	0.13	0	0.13	0	0.06	0.04	0.08	0.23	0.08	0.25	0.15	0.33	0.23	0.35	0.2	0.25	0.22	0.18	0.67	0.13	0.67	0.25	0.61	0.42	0.43	0.61	0.2	0.3	0.45	0.42	0.35	0.54	0.31
sa7	0.59	0.88	0	0.44	0.63	0.4	0.54	0.25	0.38	0.5	0.31	0.4	0.58	0.53	0.6	0.4	0.38	0.47	0.29	0.67	0.5	0.67	0.75	0.54	0.42	0.52	0.46	0.45	0.55	0.65	0.28	0.3	0.17	0.5
sa9	0.43	0.5	0.5	0.25	0.5	0.46	0.38	0.58	0.45	0	0.75	0.1	1	0.81	0.7	0.9	0.81	0.53	0.32	0.67	0.81	0.67	0.75	0.83	0.88	0.51	0.75	0	0.55	0.6	0.67	0.6	0.92	0.44
sa10	0.27	0.54	0.13	0	0	0.39	0.58	0.15	0.35	0.25	0.31	0.5	0.25	0.33	0.4	0.35	0.38	0.25	0.14	0.67	0.38	0.67	0.33	0.46	0.42	0.38	0.5	0.35	0.35	0.45	0.48	0.35	0.58	0.5
sa13	0.39	0.46	0.38	0.44	0.13	0.31	0.38	0.25	0.21	0.17	0.25	0.2	0.25	0.39	0.5	0.35	0.38	0.18	0.07	0.67	0.13	0.67	0.17	0.61	0.5	0.31	0.39	0.05	0.4	0.35	0.2	0.2	0.25	0.19
sa15	0.77	0.88	0.38	0.81	0.75	0.77	0.67	0.88	0.64	0.42	0.69	0.5	1	0.78	0.85	0.8	0.69	0.88	0.96	0.67	0.81	0.67	1	1	0.75	0.7	0.79	0.45	0.75	0.75	0.77	0.6	0.92	0.69
sa19	0.75	0.75	1	0.75	0.5	0.56	0.67	0.46	0.66	0.5	0.63	0.55	0.75	0.83	0.7	0.5	0.69	0.83	0.75	0.67	0.75	0.67	1	0.75	0.58	0.67	0.71	0.45	0.75	0.9	0.8	0.9	0.71	0.75
sa22	0.52	0.75	0.25	0.5	0.13	0.77	0.63	0.71	0.25	0.25	0.13	0.2	0.58	0.61	0.7	0.6	0.44	0.46	0.46	0.67	0.44	0.67	0.5	0.57	0.75	0.45	0.57	0.25	0.5	0.35	0.33	0.1	0.5	0.44
sa24	0.52	0.5	0.5	0.63	0.5	0.46	0.29	0.63	0.88	0.75	0.81	0.95	0.92	0.86	0.85	0.9	0.61	0.62	0.61	0.67	0.58	0.67	0.67	0.75	0.17	0.72	0.67	0.85	0.9	0.6	0.73	0.95	0.63	0.63
jp1	0.61	0.63	0.25	1	0.13	0.43	0.45	0.42	0.53	0.08	0.38	0.65	0.58	0.52	0.6	0.6	0.5	0.35	0.17	0.67	0.44	0.67	0.33	0.68	0.75	0.52	0.63	0.5	0.63	0.65	0.6	0.75	0.58	0.56
jp2	0.46	0.63	0.38	0.08	0	0.38	0.2	0.5	0.72	0.75	0.69	0.9	0.5	0.47	0.6	0.3	0.56	0.44	0.32	0.67	0.63	0.67	0.67	0.96	0.33	0.66	0.71	0.85	0.45	0.65	0.17	0.13	0.17	0.25
jp3	0.66	0.71	0.5	0.56	0.88	0.42	0.42	0.42	0.44	0.25	0.56	0.35	0.5	0.41	0.35	0.4	0.5	0.41	0.43	0.67	0.44	0.67	0.42	0.46	0.67	0.43	0.43	0.35	0.45	0.5	0.45	0.3	0.54	0.44
jp4	0.63	0.75	0.63	0.44	0.63	0.42	0.29	0.54	0.6	0.87	0.38	0.65	0.63	0.33	0.2	0.5	0.19	0.68	0.79	0.67	0.56	0.67	0.75	0.71	0.67	0.6	0.75	0.6	0.25	0.7	0.72	0.65	0.88	0.5
jp6	0.52	0.63	0.38	0.69	0	0.35	0.33	0.38	0.41	0.25	0.44	0.3	0.5	0.38	0.45	0.25	0.38	0.37	0.32	0.67	0.5	0.67	0.5	0.36	0.67	0.4	0.54	0.25	0.45	0.35	0.44	0.45	0.5	0.31
jp8	0.54	0.67	0.38	0.69	0	0.73	0.92	0.54	0.58	0.5	0.56	0.7	0.75	0.48	0.55	0.45	0.5	0.71	0.54	0.67	0.63	0.67	0.92	0.93	0.92	0.72	0.88	0.7	0.5	0.9	0.52	0.3	0.71	0.63
jp11	0.88	0.88	1	0.88	0.75	0.65	0.75	0.54	0.59	0.25	0.81	0.5	1	0.92	0.9	1	0.81	0.74	0.61	0.67	0.69	0.67	0.75	0.75	0.92	0.66	0.64	0.35	0.95	0.85	0.67	0.7	0.63	0.63
jp14	0.39	0.54	0.38	0.19	0.25	0.52	0.67	0.38	0.38	0.42	0.69	0.35	0.17	0.33	0.35	0.25	0.44	0.69	0.64	0.67	0.75	0.67	0.83	0.75	0.67	0.56	0.82	0.3	0.4	0.83	0.19	0.4	0.08	0.13
jp15	0.82	0.92	0.38	0.88	0.88	0.52	0.15	0.83	0.61	0.25	0.44	0.55	1	0.69	0.75	0.8	0.5	0.79	0.68	0.67	0.83	0.67	0.83	0.93	1	0.63	0.64	0.35	0.7	0.85	0.83	0.85	1	0.75
jp16	0.32	0.46	0	0.06	0.75	0.4	0.46	0.31	0.36	0.33	0.38	0.19	0.5	0.64	0.5	0.95	0.44	0.36	0.48	0.67	0.31	0.67	0.33	0.36	0.58	0.39	0.43	0.31	0.4	0.4	0.44	0.35	0.48	0.63
sp17	0.48	0.5	0.38	0.44	0.63	0.48	0.5	0.48	0.3	0.25	0.44	0.2	0.33	0.5	0.45	0.45	0.69	0.53	0.5	0.67	0.58	0.67	0.5	0.36	0.75	0.47	0.64	0.2	0.4	0.6	0.52	0.45	0.5	0.5
sta2	0.45	0.38	0.5	0.56	0.38	0.33	0.33	0.33	0.71	0.92	0.38	0.75	0.63	0.66	0.75	0.65	0.56	0.67	0.57	0.72	0.75	0.63	0.75	0.68	0.58	0.64	0.5	0.8	0.7	0.6	0.66	0.6	0.54	0.63
sta3	0.88	0.79	1	0.88	1	0.23	0.08	0.38	0.18	0.33	0.06	0.05	0.5	0.41	0.31	0.6	0.17	0.75	0.71	0.75	0.81	0.63	0.5	0.75	0.75	0.44	0.54	0.2	0.19	0.5	0.17	0.15	0.13	0.31
sta4	0.59	0.58	0.38	0.56	0.88	0.5	0.5	0.5	0.74	0.83	0.81	0.75	0.75	0.72	0.65	0.7	0.75	0.62	0.57	0.72	0.5	0.57	0.58	0.57	0.83	0.63	0.79	0.75	0.7	0.4	0.5	0.45	0.5	0.56
sta6	0.59	0.88	0.13	0.63	0.13	0.5	0.42	0.6	0.71	0.83	0.69	0.75	0.83	0.61	0.75	0.6	0.44	0.79	0.75	0.91	0.63	0.74	0.83	0.75	0.83	0.67	0.71	0.75	0.6	0.8	0.62	0.35	0.92	0.58
sta8	0.27	0.04	0.13	0.56	0.5	0.4	0.42	0.38	0.53	0	0.5	0.75	0.5	0.64	0.6	0.6	0.63	0.65	0.61	0.59	0.81	0.59	0.83	0.58	0.63	0.62	0.71	0.58	0.7	0.55	0.25	0.3	0.13	0.31
sta10	0.18	0.25	0.25	0.06	0.13	0.44	0.29	0.58	0.35	0.08	0.44	0.25	0.58	0.59	0.45	0.85	0.38	0.4	0.32	0.41	0.5	0.57	0.5	0.81	0.5	0.4	0.54	0.15	0.35	0.4	0.44	0.4	0.38	0.56
sta11	0.5	0.6	0.38	0.42	0.5	0.21	0.17	0.25	0.32	0.25	0.31	0.31	0.5	0.38	0.7	0	0.31	0.55	0.43	0.4	0.94	0.5	0.25	0.58	1	0.47	0.68	0.19	0.6	0.4	0.53	0.25	0.67	0.58
sta12	0.82	0.75	1	0.88	0.75	0.27	0.2	0.33	0.64	0.83	0.56	0.45	0.92	0.52	0.5	0.5	0.56	0.58	0.57	0.81	0.56	0.5	0.42	0.75	0.25	0.6	0.65	0.65	0.75	0.6	0.63	0.55	0.75	0.58
sta14	0.23	0.25	0.13	0.19	0.38	0.38	0.29	0.46	0.7	0.75	0.38	0.85	0.83	0.63	0.9	0.5	0.5	0.74	0.71	0.69	0.88	0.43	0.68	0.54	0.33	0.6	0.54	0.7	0.85	0.55	0.47	0.6	0.38	0.31
cl2	0.3	0.5	0.13	0.06	0.38	0.67	0.92	0.42	0.28	0.25	0.25	0.15	0.58	0.34	0.3	0.45	0.38	0.43	0.38	0.59	0.25	0.45	0.5	0.36	0.58	0.26	0.13	0.2	0.35	0.3	0.38	0.06	0.44	0.5
cl3	0.65	0.65	0.38	0.75	0.75	0.69	0.63	0.75	0.6	0.67	0.63	0.85	0.42	0.52	0.5	0.5	0.5	0.54	0.48	0.53	0.69	0.53	0.58	0.54	0.67	0.56	0.61	0.6	0.5	0.55	0.56	0.6	0.5	0.69
cl5	0.82	0.79	0.88	0.88	0.75	0.6	0.88	0.33	0.6	0.5	0.63	0.55	0.67	0.67	0.85	0.5	0.63	0.58	0.5	0.72	0.44	0.87	0.75	0.89	0.83	0.7	0.75	0.5	0.7	0.9	0.75	0.85	0.79	0.5

cl8	0.57	0.87	0.25	0.75	0.25	0.65	0.92	0.38	0.38	0.17	0.38	0.3	0.42	0.47	0.85	0.15	0.44	0.42	0.32	0.63	0.19	0.51	0.5	0.61	0.5	0.61	0.68	0.15	0.75	0.9	0.42	0.55	0.5	0.17
cl12	0.23	0.25	0.13	0	0.5	0.65	0.92	0.38	0.45	0.25	0.38	0.25	1	0.61	0.8	0.65	0.56	0.58	0.54	0.75	0.31	0.76	0.83	0.79	0.58	0.63	0.79	0.25	0.75	0.7	0.63	0.55	0.63	0.63
cl15	0.23	0.46	0.25	0	0	0.43	0.56	0.25	0.36	0.42	0.25	0.35	0.63	0.47	0.45	0.6	0.38	0.26	0.18	0.31	0.31	0.03	0.17	0	0	0.21	0	0.4	0.4	0.25	0.06	0.2	0	0
cl16	0.35	0.33	0.75	0	0	0.44	0.63	0.25	0.45	0.75	0.38	0.3	0.58	0.42	0.55	0.4	0.5	0.25	0.21	0.42	0.06	0.38	0.42	0.29	0.38	0.48	0.19	0.55	0.65	0.44	0.25	0.2	0.21	0.44
cl17	0.56	0.67	0.38	0.25	0.88	0.5	0.75	0.25	0.59	0.33	0.56	0.7	0.75	0.67	0.7	0.55	0.69	0.71	0.71	0.61	0.5	0.86	1	0.89	0.58	0.69	0.82	0.6	0.6	0.8	0.34	0.15	0.48	0.44
cl18	0.7	0.92	0.88	0.19	0.88	0.83	0.96	0.71	0.63	0.67	0.56	0.5	0.75	0.75	0.7	0.6	0.75	0.67	0.75	0.69	0.5	0.79	0.67	0.79	0.83	0.72	0.86	0.55	0.65	0.75	0.8	0.65	0.92	0.75
cl24	0.36	0.75	0	0.13	0	0.21	0.08	0.33	0.25	0.17	0.31	0.05	0.67	0.22	0.1	0	0.75	0.38	0.13	0.67	0.38	0.67	0.67	0.79	0.67	0.39	0.57	0.15	0.3	0.4	0.5	0.35	0.92	0.19
sa1	0.41	0.46	0	0.63	0.25	0.9	0.96	0.63	0.66	0.42	0.88	0.5	0.67	0.59	0.85	0.4	0.63	0.65	0.54	0.67	0.63	0.67	0.92	0.61	0.92	0.62	0.54	0.4	0.9	0.7	0.67	0.9	0.5	0.56
sa4	0.48	0.67	0.13	0.42	0.38	0.59	0.9	0.33	0.64	0.67	0.5	0.65	0.56	0.68	0.75	0.7	0.56	0.3	0.38	0.67	0.44	0.67	0.5	0.62	0.58	0.57	0.54	0.75	0.75	0.55	0.8	0.95	0.71	0.69
sa5	0.35	0.4	0	0.25	0.75	0.45	0.67	0.13	0.2	0.08	0	0.1	0.58	0.46	0.31	0.7	0.08	0.22	0.18	0.67	0.19	0.67	0.33	0.38	0.5	0.28	0.54	0.05	0.08	0.31	0.25	0.4	0.04	0.5
sa8	0.1	0	0	0.13	0.5	0.55	0.6	0.5	0.06	0	0.06	0	0.17	0.17	0.35	0	0.19	0.28	0.21	0.67	0.31	0.67	0.5	0.25	0	0.32	0.46	0	0.35	0.35	0.06	0	0.17	0
sa11	0.43	0.58	0.13	0.38	0.25	0.73	0.88	0.56	0.38	0.42	0.69	0.15	0.33	0.56	0.55	0.4	0.69	0.43	0.54	0.67	0.17	0.67	0.58	0.18	0.75	0.43	0.54	0.25	0.5	0.35	0.19	0.25	0.25	0.06
sa12	0.63	0.79	0.63	0.44	0.5	0.58	0.79	0.38	0.69	0.67	0.88	0.5	0.5	0.69	0.7	0.5	0.88	0.66	0.54	0.67	0.75	0.67	0.75	0.86	0.5	0.84	0.54	0.55	0.75	0.7	0.84	0.85	0.96	0.63
sa14	0.64	0.75	0.63	0.69	0.25	0.19	0.21	0.17	0.4	0	0.5	0.25	0.67	0.41	0.6	0.15	0.63	0.42	0.36	0.67	0.19	0.67	0.42	0.71	0.33	0.48	0.81	0.15	0.55	0.45	0.11	0.15	0.13	0.06
sa16	0.23	0.38	0	0.17	0.25	0.39	0.5	0.17	0.35	0.08	0.38	0.35	0.17	0.44	0.6	0.15	0.5	0.32	0.21	0.67	0.38	0.67	0.5	0.48	0.67	0.48	0.48	0.25	0.65	0.65	0.56	0.4	0.96	0.25
sa17	0.45	0.58	0.38	0.38	0.25	0.46	0.63	0.29	0.66	0.75	0.75	0.7	0.5	0.48	0.5	0.45	0.56	0.26	0.21	0.67	0.25	0.67	0.42	0.39	0.42	0.52	0.6	0.75	0.55	0.3	0.39	0.4	0.33	0.44
sa18	0.31	0.5	0	0	0.38	0.48	0.42	0.54	0.76	1	0.56	0.95	0.92	0.63	0.85	0.65	0.63	0.24	0.04	0.67	0.19	0.67	0.67	0.43	0.08	0.68	0.54	0.95	0.9	0.5	0.65	0.6	0.58	0.56
sa20	0.73	0.96	0	0.67	0.88	0.69	0.75	0.63	0.43	0.25	0.56	0.4	0.67	0.61	0.75	0.45	0.69	0.66	0.71	0.67	0.69	0.67	0.83	0.96	0.67	0.65	0.89	0.35	0.55	0.7	0.47	0.5	0.33	0.63
sa21	0.19	0.3	0.13	0.08	0.13	0.1	0.08	0.13	0.58	0.5	0.44	0.6	0.56	0.47	0.63	0.3	0.56	0.42	0.21	0.67	0.5	0.67	0.58	0.36	0.25	0.62	0.67	0.75	0.55	0.5	0.31	0.3	0.21	0.56
sa23	0.21	0.33	0.13	0.13	0.13	0.63	0.92	0.33	0.34	0.17	0.44	0.2	0.42	0.53	0.65	0.5	0.5	0.32	0.11	0.67	0.44	0.67	0.67	0.57	0.58	0.38	0.38	0.15	0.55	0.55	0.3	0.3	0.42	0.13
jp7	0.38	0.46	0.13	0.25	0.5	0.55	0.7	0.4	0.49	0.17	0.31	0.5	0.63	0.55	0.7	0.5	0.56	0.44	0.42	0.67	0.33	0.67	0.33	0.38	0.38	0.56	0.75	0.3	0.7	0.56	0.57	0.6	0.46	0.58
jp9	0.38	0.5	0.38	0.31	0.13	0.6	0.67	0.54	0.48	0.83	0.38	0.45	0.33	0.55	0.7	0.5	0.56	0.2	0.18	0.67	0.25	0.67	0.25	0.43	0.38	0.43	0.25	0.55	0.65	0.3	0.22	0.25	0.1	0.31
jp10	0.48	0.5	0.25	0.58	0.5	0.6	0.79	0.42	0.41	0.67	0.33	0.3	0.33	0.38	0.38	0.25	0.5	0.43	0.46	0.67	0.38	0.67	0.42	0.79	0.58	0.57	0.88	0.4	0.17	0.6	0.47	0.3	0.75	0.38
jp12	0.43	0.75	0	0.19	0.38	0.69	0.88	0.5	0.55	0.42	0.69	0.55	0.42	0.47	0.75	0.2	0.56	0.51	0.5	0.67	0.44	0.67	0.67	0.43	0.83	0.58	0.64	0.6	0.55	0.65	0.42	0.35	0.5	0.31
jp13	0.1	0.25	0	0	0	0.08	0.13	0.04	0.11	0.17	0.25	0.05	0.08	0.27	0.3	0.15	0.5	0.22	0	0.67	0.25	0.67	0.5	0.32	0.38	0.3	0.5	0.05	0.25	0.5	0.17	0.2	0.21	0.13
jp18	0.7	0.83	0.88	0.44	0.83	0.67	0.71	0.63	0.51	0.33	0.56	0.45	0.5	0.61	0.95	0.45	0.63	0.55	0.46	0.67	0.44	0.67	0.67	0.54	0.67	0.6	0.54	0.4	0.6	0.75	0.77	0.65	0.92	0.63
jp19	0.29	0.48	0	0.13	0.38	0.4	0.46	0.33	0.73	0.63	0.63	0.6	0.92	0.67	0.7	0.55	0.75	0.48	0.39	0.67	0.44	0.67	0.42	0.54	0.67	0.62	0.36	0.85	0.6	0.65	0.5	0.55	0.54	0.5
sta1	0.04	0.1	0	0	0	0.56	0.96	0.21	0.43	0.25	0.38	0.5	0.5	0.53	0.55	0.4	0.63	0.32	0.18	0.38	0.44	0.55	0.67	0.57	0.58	0.43	0.32	0.5	0.55	0.35	0.42	0.3	0.63	0.19
sta5	0.39	0.48	0	0.56	0.25	0.4	0.58	0.21	0.49	0.42	0.5	0.45	0.58	0.61	0.85	0.45	0.63	0.33	0.25	0.31	0.5	0.26	0.42	0.43	0.17	0.52	0.43	0.5	0.9	0.3	0.61	0.75	0.5	0.63
sta7	0.45	0.71	0	0.06	0.88	0.48	0.5	0.46	0.3	0.25	0.44	0.25	0.33	0.42	0.5	0.25	0.63	0.58	0.61	0.66	0.38	0.29	0.42	0.21	0.5	0.42	0.5	0.15	0.55	0.6	0.3	0.05	0.58	0.13
sta9	0.73	0.92	0.38	0.5	0.75	0.77	0.83	0.71	0.68	0.75	0.56	0.55	0.83	0.73	1	0.5	0.56	0.86	0.82	0.97	0.69	0.67	1	0.79	0.75	0.77	0.75	0.6	0.85	1	0.35	0.45	0.25	0.25
sta13	0.59	0.63	0.5	0.75	0.25	0.48	0.63	0.29	0.51	0.42	0.69	0.13	0.75	0.75	0.75	0.75	0.81	0.67	0.61	0.75	0.63	0.63	0.92	0.57	0.25	0.55	0.57	0.19	0.65	0.75	0.77	0.75	0.75	0.75
	0.47	0.58	0.31	0.39	0.41	0.48	0.53	0.43	0.49	0.41	0.47	0.44	0.6	0.54	0.6	0.5	0.54	0.5	0.44	0.63	0.51	0.63	0.59	0.6	0.58	0.53	0.59	0.42	0.55	0.58	0.49	0.47	0.53	0.45

MUSICAL 0.47
Appreciation 0.58
Instrument 0.31
Vocal 0.39
Composer 0.41

KINESTHETIC 0.48
Ahtletic 0.53
Dexterity 0.43

MATHEMATIC 0.49
School Math 0.41
Logic 0.47
Everyday Matl 0.44
ProblemSolvin 0.6

SPATIAL 0.54
Awareness 0.6
Art Design 0.5
Working w/ Objects 0.54

LINGUISTIC 0.5
Expressive 0.44
Rhetorical 0.63
Written/Reading 0.51

INTERPERSONAL 0.63
Persuasion 0.59
Sensitivity 0.6
Working w/ People 0.58

INTRAPERSONAL 0.53
Personal Knowledge 0.59
Calculations 0.42
Spatial ProblemSolving 0.55
Effectiveness 0.58

NATURALIST 0.49
Science 0.47
Animal 0.53
Plant 0.45

APPENDIX L

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY GENDER

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY GENDER

		Music Appreciation			*Music Instrument*			*Music Vocal*			*Music Composer*		
Music		All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.47	0.58	0.61	0.55	0.31	0.36	0.25	0.39	0.44	0.32	0.41	0.42	0.4
Standard Error	0.02	0.02	0.03	0.04	0.03	0.04	0.05	0.03	0.04	0.05	0.03	0.05	0.05
Median	0.46	0.63	0.63	0.5	0.25	0.38	0.13	0.42	0.44	0.25	0.38	0.38	0.38
Mode	0.59	0.75	0.75	0.46	0.13	0.13	0	0	0.25	0	0.13	0.13	0.25
Standard Deviation	0.2	0.22	0.21	0.23	0.29	0.28	0.29	0.28	0.28	0.27	0.3	0.32	0.28
Sample Variance	0.04	0.05	0.05	0.05	0.08	0.08	0.08	0.08	0.08	0.07	0.09	0.1	0.08
Kurtosis	-0.5	-0.1	0.41	-0.2	0.16	0.51	0.05	-1.1	-0.9	-1	-1.2	-1.4	-1
Skewness	-0	-0.6	-0.8	-0.3	0.95	1.02	1.08	0.24	0.07	0.5	0.24	0.18	0.33
Range	0.83	0.96	0.88	0.96	1	1	0.88	1	1	0.88	1	1	0.88
Minimum	0.04	0	0.04	0	0	0	0	0	0	0	0	0	0
Maximum	0.88	0.96	0.92	0.96	1	1	0.88	1	1	0.88	1	1	0.88
Sum	38	47.3	28.1	19.2	25.1	16.5	8.63	31.6	20.5	11.1	33.4	19.5	13.9
Count	81	81	46	35	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06	0.08	0.06	0.08	0.1	0.06	0.08	0.09	0.07	0.09	0.1
		z = 1.21			z = 1.72			z = 1.95			z = .30		

		Kinesthetic Athletic			*Kinesthetic Dexterity*		
Kinesthetic		All	Female	Male	All	Female	Male
Mean	0.48	0.53	0.42	0.67	0.43	0.45	0.39
Standard Error	0.02	0.03	0.03	0.04	0.02	0.03	0.03
Median	0.46	0.54	0.42	0.7	0.42	0.45	0.38
Mode	0.4	0.08	0.42	0.92	0.38	0.38	0.33
Standard Deviation	0.18	0.27	0.22	0.25	0.19	0.18	0.19
Sample Variance	0.03	0.07	0.05	0.06	0.03	0.03	0.04
Kurtosis	-0.2	-1	-0.6	0.44	-0.3	0.04	-0.4
Skewness	-0.1	-0.1	0.25	-1	0.32	0.33	0.44
Range	0.83	0.92	0.88	0.88	0.83	0.79	0.79
Minimum	0.06	0.04	0.04	0.08	0.04	0.08	0.04
Maximum	0.9	0.96	0.92	0.96	0.88	0.88	0.83
Sum	38.9	42.7	19.3	23.4	34.7	20.9	13.8
Count	81	81	46	35	81	46	35
Confidence Level(95.0%)	0.04	0.06	0.07	0.09	0.04	0.05	0.07
		z = 4.69			z = 1.41		

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY GENDER

		School Math			*Logic Games*			*Everyday Math*			*Problem Solving*		
Mathematical		All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.49	0.41	0.41	0.42	0.47	0.47	0.48	0.44	0.46	0.41	0.6	0.64	0.56
Standard Error	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.04
Median	0.49	0.38	0.33	0.42	0.44	0.44	0.5	0.45	0.48	0.45	0.58	0.58	0.58
Mode	0.38	0.25	0.25	0.42	0.38	0.38	0.38	0.55	0.55	0.5	0.58	0.58	0.58
Standard Deviation	0.17	0.27	0.28	0.26	0.21	0.21	0.2	0.24	0.24	0.24	0.23	0.23	0.22
Sample Variance	0.03	0.07	0.08	0.07	0.04	0.05	0.04	0.06	0.06	0.06	0.05	0.05	0.05
Kurtosis	-0.6	-1	-1.1	-0.9	-0.6	-1	0.26	-0.9	-1.1	-0.5	-0.6	-0.9	-0.2
Skewness	-0	0.34	0.36	0.33	0.02	0.13	-0.2	0.18	0.14	0.22	-0	0.02	-0.1
Range	0.81	1	0.92	1	0.88	0.75	0.88	0.95	0.9	0.95	0.92	0.83	0.92
Minimum	0.06	0	0	0	0	0.06	0	0	0.05	0	0.08	0.17	0.08
Maximum	0.88	1	0.92	1	0.88	0.81	0.88	0.95	0.95	0.95	1	1	1
Sum	39.4	33.5	18.8	14.7	38.3	21.6	16.7	35.6	21.3	14.3	49	29.4	19.6
Count	81	81	46	35	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.04	0.06	0.08	0.09	0.05	0.06	0.07	0.05	0.07	0.08	0.05	0.07	0.07
		z = .17			z = .22			z = .93			z = 1.59		

		Spatial Awareness			*Art Design*			*Working with Objects*		
Spatial		All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.54	0.6	0.57	0.63	0.5	0.56	0.43	0.54	0.51	0.57
Standard Error	0.02	0.02	0.03	0.03	0.03	0.04	0.03	0.02	0.03	0.03
Median	0.55	0.6	0.58	0.7	0.5	0.6	0.45	0.56	0.5	0.56
Mode	0.61	0.7	0.5	0.7	0.5	0.7	0.5	0.56	0.5	0.63
Standard Deviation	0.16	0.21	0.22	0.21	0.24	0.25	0.2	0.18	0.19	0.16
Sample Variance	0.03	0.05	0.05	0.04	0.06	0.06	0.04	0.03	0.04	0.02
Kurtosis	-0.1	-0.6	-0.6	-0	-0.4	-0.5	-0.3	-0.1	-0.7	2.55
Skewness	-0	-0.2	0	-0.5	-0.1	-0.2	-0.4	-0.4	0.02	-1
Range	0.77	0.9	0.85	0.9	1	1	0.8	0.79	0.75	0.79
Minimum	0.17	0.1	0.15	0.1	0	0	0	0.08	0.13	0.08
Maximum	0.94	1	1	1	1	1	0.8	0.88	0.88	0.88
Sum	43.7	48.3	26.3	22	40.7	25.8	14.9	43.5	23.5	20
Count	81	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06	0.07	0.05	0.07	0.07	0.04	0.06	0.05
		z = 1.25			z = 2.60			z = 1.54		

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY GENDER

		Expressive			*Rhetorical*			*Written/Reading*		
Linguistic		All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.5	0.44	0.49	0.38	0.63	0.61	0.65	0.51	0.6	0.4
Standard Error	0.02	0.02	0.03	0.04	0.02	0.02	0.02	0.02	0.03	0.03
Median	0.47	0.46	0.5	0.36	0.67	0.67	0.67	0.5	0.56	0.38
Mode	0.62	0.54	0.54	0.21	0.67	0.67	0.67	0.5	0.56	0.44
Standard Deviation	0.18	0.21	0.19	0.21	0.14	0.15	0.13	0.21	0.19	0.17
Sample Variance	0.03	0.04	0.04	0.05	0.02	0.02	0.02	0.04	0.04	0.03
Kurtosis	-0.9	-0.6	-0.2	-0.8	1.74	1.26	2.99	-0.7	0.1	-0.5
Skewness	0.09	-0	-0.1	0.23	-1	-0.9	-1	-0	-0.4	0.29
Range	0.72	0.96	0.89	0.82	0.8	0.77	0.66	0.88	0.81	0.69
Minimum	0.16	0	0.07	0	0.17	0.17	0.31	0.06	0.13	0.06
Maximum	0.88	0.96	0.96	0.82	0.97	0.94	0.97	0.94	0.94	0.75
Sum	40.7	35.9	22.6	13.3	50.9	28.3	22.6	41.3	27.4	13.9
Count	81	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06	0.07	0.03	0.05	0.04	0.05	0.06	0.06
		z = 2.43			z = 1.28			z = 4.98		

		Personal Knowledge			*Sensitivity*			*Working with People*		
Interpersonal		All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.63	0.59	0.6	0.58	0.6	0.65	0.54	0.58	0.63	0.51
Standard Error	0.02	0.02	0.03	0.03	0.02	0.03	0.04	0.02	0.03	0.04
Median	0.67	0.58	0.58	0.58	0.58	0.62	0.54	0.58	0.67	0.58
Mode	0.67	0.5	0.5	0.42	0.75	0.75	0.79	0.67	0.67	0.58
Standard Deviation	0.14	0.21	0.22	0.21	0.21	0.19	0.24	0.22	0.2	0.23
Sample Variance	0.02	0.05	0.05	0.04	0.05	0.03	0.06	0.05	0.04	0.05
Kurtosis	3.93	-0.7	-0.9	-0.4	-0.4	-0.9	-0.6	-0	-0.7	-0.1
Skewness	-1.4	0.1	-0	0.31	-0.2	0.14	-0	-0.4	-0.1	-0.6
Range	0.91	0.83	0.83	0.83	1	0.68	0.96	1	0.83	0.92
Minimum	0.03	0.17	0.17	0.17	0	0.32	0	0	0.17	0
Maximum	0.93	1	1	1	1	1	0.96	1	1	0.92
Sum	51.2	47.8	27.4	20.4	48.9	30	18.9	46.8	28.8	18
Count	81	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.03	0.05	0.07	0.07	0.05	0.06	0.08	0.05	0.06	0.08
		z = .42			z = 2.23			z = 2.46		

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY GENDER

		Personal Knowledge			*Calculations*			*Spatial Problem Solving*			*Effectiveness*		
Intrapersonal		All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.53	0.59	0.63	0.54	0.42	0.42	0.41	0.55	0.52	0.59	0.58	0.59	0.56
Standard Error	0.02	0.02	0.02	0.04	0.03	0.04	0.04	0.02	0.03	0.03	0.02	0.03	0.03
Median	0.53	0.57	0.64	0.54	0.4	0.36	0.4	0.55	0.53	0.6	0.6	0.6	0.55
Mode	0.43	0.54	0.54	0.54	0.35	0.35	0.15	0.55	0.4	0.55	0.6	0.6	0.3
Standard Deviation	0.14	0.19	0.16	0.21	0.24	0.25	0.24	0.22	0.23	0.2	0.18	0.17	0.2
Sample Variance	0.02	0.03	0.02	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.04
Kurtosis	-0.2	0.8	-0	0.4	-0.9	-0.9	-0.7	-0.6	-0.6	0.14	-0.7	-0.8	-0.7
Skewness	0.07	-0.4	0.18	-0.5	0.23	0.23	0.24	-0.2	0.13	-0.6	0.2	0.24	0.24
Range	0.73	1	0.71	0.89	0.95	0.85	0.95	0.92	0.9	0.82	0.75	0.64	0.75
Minimum	0.21	0	0.29	0	0	0	0	0.08	0.1	0.08	0.25	0.31	0.25
Maximum	0.94	1	1	0.89	0.95	0.85	0.95	1	1	0.9	1	0.95	1
Sum	43.1	48.1	29.1	19	33.9	19.5	14.4	44.8	24.1	20.7	46.9	27.3	19.6
Count	81	81	46	35	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.03	0.04	0.05	0.07	0.05	0.07	0.08	0.05	0.07	0.07	0.04	0.05	0.07
		z = 2.11			z = .18			z = 1.46			z = .71		

		Science			*Animal*			*Plant*		
Naturalist		All	Female	Male	All	Female	Male	All	Female	Male
Mean	0.49	0.47	0.49	0.44	0.53	0.56	0.49	0.45	0.49	0.4
Standard Error	0.02	0.03	0.03	0.04	0.03	0.04	0.05	0.02	0.03	0.04
Median	0.5	0.45	0.5	0.4	0.54	0.56	0.5	0.5	0.53	0.44
Mode	0.25	0.3	0.65	0.3	0.5	0.5	0.5	0.63	0.63	0.63
Standard Deviation	0.21	0.24	0.22	0.26	0.26	0.25	0.27	0.2	0.18	0.23
Sample Variance	0.04	0.06	0.05	0.07	0.07	0.06	0.08	0.04	0.03	0.05
Kurtosis	-0.9	-0.8	-0.6	-0.9	-0.9	-0.8	-0.9	-0.8	-0.9	-1.2
Skewness	-0.2	0.12	0.03	0.28	-0.1	-0.2	0.11	-0.4	-0.3	-0.3
Range	0.81	0.95	0.9	0.95	1	0.92	0.96	0.81	0.69	0.75
Minimum	0.06	0	0.05	0	0	0.08	0	0	0.13	0
Maximum	0.88	0.95	0.95	0.95	1	1	0.96	0.81	0.81	0.75
Sum	39.8	38.2	22.6	15.6	42.8	25.7	17.1	36.7	22.6	14.2
Count	81	81	46	35	81	46	35	81	46	35
Confidence Level(95.0%)	0.05	0.05	0.07	0.09	0.06	0.07	0.09	0.05	0.05	0.08
		z = .92			z = 1.19			z = 1.91		

APPENDIX M

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY AGE

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY AGE

		Appreciation				*Instrument*				*Vocal*				*Composer*			
Music		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.47	0.58	0.54	0.66	0.55	0.31	0.25	0.38	0.29	0.39	0.34	0.44	0.39	0.41	0.39	0.47	0.37
Standard Error	0.02	0.02	0.04	0.03	0.05	0.03	0.05	0.06	0.05	0.03	0.05	0.05	0.06	0.03	0.05	0.06	0.06
Median	0.46	0.63	0.5	0.73	0.5	0.25	0.13	0.38	0.38	0.42	0.34	0.44	0.38	0.38	0.38	0.44	0.25
Mode	0.59	0.75	0.5	0.75	0.46	0.13	0.13	0.38	0.38	0	0.13	0.75	0.56	0.13	0.5	0.13	0
Standard Deviation	0.2	0.22	0.23	0.18	0.24	0.29	0.26	0.34	0.24	0.28	0.24	0.28	0.31	0.3	0.27	0.31	0.32
Sample Variance	0.04	0.05	0.05	0.03	0.06	0.08	0.07	0.11	0.06	0.08	0.06	0.08	0.1	0.09	0.07	0.09	0.1
Kurtosis	-0.5	-0.1	0.43	0.58	-0.4	0.16	0.08	-0.7	1.58	-1.1	-1.2	-1.2	-1	-1.2	-0.9	-1.3	-1.3
Skewness	-0	-0.6	-0.4	-1	-0.3	0.95	1.07	0.73	0.9	0.24	0.15	0.09	0.34	0.24	0.29	0.06	0.41
Range	0.83	0.96	0.96	0.67	0.88	1	0.88	1	1	1	0.75	0.88	1	1	0.88	1	0.88
Minimum	0.04	0	0	0.25	0.04	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	0.88	0.96	0.96	0.92	0.92	1	0.88	1	1	1	0.75	0.88	1	1	0.88	1	0.88
Sum	38	47.3	14	18.5	14.8	25.1	6.5	10.8	7.88	31.6	8.94	12.2	10.4	33.4	10.1	13.3	10
Count	81	81	26	28	27	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.04	0.05	0.09	0.07	0.1	0.06	0.11	0.13	0.09	0.06	0.1	0.11	0.12	0.07	0.11	0.12	0.13
			z = 2.1	z = 1.92			z = 1.5	z = 1.14			z = 1.41	z = .63			z = 1.01	z = 1.18	

		Athletic				*Dexterity*			
Kinesthetic		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.48	0.53	0.63	0.52	0.44	0.43	0.43	0.45	0.4
Standard Error	0.02	0.03	0.06	0.05	0.04	0.02	0.03	0.03	0.04
Median	0.46	0.54	0.67	0.5	0.5	0.42	0.4	0.46	0.38
Mode	0.4	0.08	0.08	0.29	0.5	0.38	0.29	0.58	0.38
Standard Deviation	0.18	0.27	0.29	0.28	0.19	0.19	0.17	0.17	0.22
Sample Variance	0.03	0.07	0.09	0.08	0.03	0.03	0.03	0.03	0.05
Kurtosis	-0.2	-1	-0.5	-1.4	-0.5	-0.3	-0.1	-0.8	0.03
Skewness	-0.1	-0.1	-0.8	-0	-0.4	0.32	0.58	-0.1	0.6
Range	0.83	0.92	0.88	0.83	0.71	0.83	0.71	0.63	0.83
Minimum	0.06	0.04	0.08	0.08	0.04	0.04	0.13	0.13	0.04
Maximum	0.9	0.96	0.96	0.92	0.75	0.88	0.83	0.75	0.88
Sum	38.9	42.7	16.3	14.5	11.8	34.7	11.1	12.7	10.9
Count	81	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.04	0.06	0.12	0.11	0.07	0.04	0.07	0.07	0.09
			z = 1.4	z = 2.81			z = .56	z = .94	

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY AGE

		School Math				*Logic Games*				*Everyday Math*				*Problem Solving*			
Mathematical		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.49	0.41	0.45	0.48	0.31	0.47	0.46	0.49	0.47	0.44	0.4	0.49	0.43	0.6	0.62	0.6	0.59
Standard Error	0.02	0.03	0.05	0.05	0.05	0.02	0.05	0.03	0.04	0.03	0.05	0.04	0.05	0.03	0.04	0.04	0.05
Median	0.49	0.38	0.42	0.46	0.25	0.44	0.38	0.56	0.44	0.45	0.41	0.53	0.35	0.58	0.58	0.58	0.58
Mode	0.38	0.25	0.25	0.5	0.25	0.38	0.38	0.56	0.44	0.55	0.5	0.55	0.35	0.58	0.58	0.58	1
Standard Deviation	0.17	0.27	0.27	0.26	0.26	0.21	0.25	0.18	0.2	0.24	0.25	0.24	0.24	0.23	0.21	0.21	0.27
Sample Variance	0.03	0.07	0.07	0.07	0.07	0.04	0.06	0.03	0.04	0.06	0.06	0.06	0.06	0.05	0.04	0.04	0.07
Kurtosis	-0.6	-1	-1.4	-0.9	0.55	-0.6	-0.7	0	-0.7	-0.9	-0.7	-0.7	-1	-0.6	-0.1	-0.7	-0.9
Skewness	-0	0.34	-0.1	0.3	1.11	0.02	0.13	-0.7	0.53	0.18	0.3	0	0.3	-0	0.02	-0.1	0.11
Range	0.81	1	0.83	0.92	0.92	0.88	0.88	0.69	0.69	0.95	0.95	0.9	0.85	0.92	0.83	0.75	0.92
Minimum	0.06	0	0	0.08	0	0	0	0.06	0.13	0	0	0.05	0.05	0.08	0.17	0.17	0.08
Maximum	0.88	1	0.83	1	0.92	0.88	0.88	0.75	0.81	0.95	0.95	0.95	0.9	1	1	0.92	1
Sum	39.4	33.5	11.8	13.4	8.29	38.3	11.9	13.8	12.6	35.6	10.4	13.6	11.6	49	16.1	16.9	16
Count	81	81	26	28	27	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.04	0.06	0.11	0.1	0.1	0.05	0.1	0.07	0.08	0.05	0.1	0.09	0.09	0.05	0.08	0.08	0.11
			z = .42	z = 2.42			z = .50	z = .39			z = 1.3	z = .93			z = .35	z = .45	

		Spatial Awareness				*Art Design*				*Working with Objects*			
Spatial		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.54	0.6	0.56	0.62	0.6	0.5	0.57	0.43	0.52	0.54	0.55	0.5	0.56
Standard Error	0.02	0.02	0.04	0.04	0.04	0.03	0.05	0.03	0.05	0.02	0.04	0.03	0.04
Median	0.55	0.6	0.58	0.7	0.6	0.5	0.54	0.48	0.6	0.56	0.56	0.5	0.56
Mode	0.61	0.7	0.7	0.7	0.5	0.5	0.7	0.5	0.7	0.56	0.56	0.44	0.5
Standard Deviation	0.16	0.21	0.21	0.22	0.22	0.24	0.25	0.18	0.27	0.18	0.2	0.15	0.19
Sample Variance	0.03	0.05	0.04	0.05	0.05	0.06	0.06	0.03	0.07	0.03	0.04	0.02	0.03
Kurtosis	-0.1	-0.6	-0.4	-0.9	-0.4	-0.4	0.38	0.49	-1	-0.1	0.29	-0.2	-0.2
Skewness	-0	-0.2	-0.6	-0.3	0.06	-0.1	-0.5	-0.3	-0	-0.4	-0.7	-0.3	-0.3
Range	0.77	0.9	0.75	0.8	0.85	1	1	0.85	0.95	0.79	0.79	0.58	0.75
Minimum	0.17	0.1	0.1	0.2	0.15	0	0	0	0.05	0.08	0.08	0.17	0.13
Maximum	0.94	1	0.85	1	1	1	1	0.85	1	0.88	0.88	0.75	0.88
Sum	43.7	48.3	14.5	17.5	16.3	40.7	14.8	11.9	14	43.5	14.3	14	15.1
Count	81	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.04	0.05	0.08	0.08	0.09	0.05	0.1	0.07	0.11	0.04	0.08	0.06	0.07
			z = 1.0	z = .34			z = 2.3	z = .70				z = 1.30	

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY AGE

		Expressive			*Rhetorical*				*Written/Reading*			
Linguistic		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.5	0.44	0.42	0.51	0.4	0.63	0.62	0.67	0.59	0.51	0.47	0.55	0.51
Standard Error	0.02	0.02	0.04	0.04	0.04	0.02	0.02	0.02	0.03	0.02	0.04	0.04	0.04
Median	0.47	0.46	0.46	0.5	0.36	0.67	0.67	0.67	0.67	0.5	0.44	0.53	0.5
Mode	0.62	0.54	0.54	0.46	0.32	0.67	0.67	0.67	0.67	0.5	0.38	0.44	0.5
Standard Deviation	0.18	0.21	0.19	0.2	0.22	0.14	0.12	0.13	0.16	0.21	0.21	0.19	0.21
Sample Variance	0.03	0.04	0.04	0.04	0.05	0.02	0.01	0.02	0.03	0.04	0.04	0.04	0.04
Kurtosis	-0.9	-0.6	-1.1	-0.2	0.13	1.74	3.01	1.63	0.91	-0.7	-0.5	-0.1	-0.9
Skewness	0.09	-0	-0.2	-0.4	0.42	-1	-1.9	-0.4	-0.9	-0	0.23	-0.1	-0.2
Range	0.72	0.96	0.64	0.79	0.96	0.8	0.5	0.59	0.77	0.88	0.81	0.77	0.69
Minimum	0.16	0	0.11	0.04	0	0.17	0.25	0.38	0.17	0.06	0.06	0.17	0.13
Maximum	0.88	0.96	0.75	0.82	0.96	0.97	0.75	0.97	0.94	0.94	0.88	0.94	0.81
Sum	40.7	35.9	10.8	14.3	10.7	50.9	16.1	18.7	16	41.3	12.3	15.3	13.7
Count	81	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.04	0.05	0.08	0.08	0.09	0.03	0.05	0.05	0.07	0.05	0.09	0.08	0.08
		z = 1.7(z = 1.94				z = 1.4; z = 2.03				z = 1.4(z = .74			

		Personal Knowledge			*Sensitivity*				*Working with People*			
Interpersonal		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.63	0.59	0.6	0.64	0.53	0.6	0.6	0.61	0.6	0.58	0.52	0.61	0.6
Standard Error	0.02	0.02	0.04	0.04	0.04	0.02	0.04	0.03	0.05	0.02	0.04	0.04	0.05
Median	0.67	0.58	0.67	0.58	0.5	0.58	0.58	0.58	0.61	0.58	0.58	0.67	0.67
Mode	0.67	0.5	0.67	0.58	0.5	0.75	0.79	0.54	0.38	0.67	0.58	0.67	0.67
Standard Deviation	0.14	0.21	0.19	0.21	0.23	0.21	0.21	0.18	0.26	0.22	0.2	0.22	0.24
Sample Variance	0.02	0.05	0.04	0.04	0.05	0.05	0.05	0.03	0.07	0.05	0.04	0.05	0.06
Kurtosis	3.93	-0.7	-0.9	-0.7	-0.9	-0.4	-1.3	-0.1	-0.3	-0	1.16	-0.2	0.05
Skewness	-1.4	0.1	0.11	0.24	0.21	-0.2	-0	-0.2	-0.2	-0.4	-0.5	-0.5	-0.6
Range	0.91	0.83	0.67	0.75	0.83	1	0.71	0.75	1	1	0.92	0.92	1
Minimum	0.03	0.17	0.25	0.25	0.17	0	0.25	0.18	0	0	0	0.08	0
Maximum	0.93	1	0.92	1	1	1	0.96	0.93	1	1	0.92	1	1
Sum	51.2	47.8	15.6	17.8	14.4	48.9	15.6	17.2	16.2	46.8	13.4	17.2	16.2
Count	81	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.03	0.05	0.08	0.08	0.09	0.05	0.09	C 0.07	0.1	0.05	0.08	0.09	0.1
		z = 1.85								z = 1.58			

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY AGE

		Personal Knowledge				*Calculations*				*Spatial Problem Solving*				*Effectiveness*			
Intrapersonal		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.53	0.59	0.55	0.62	0.61	0.42	0.42	0.47	0.36	0.55	0.52	0.57	0.56	0.58	0.54	0.64	0.56
Standard Error	0.02	0.02	0.04	0.03	0.04	0.03	0.05	0.05	0.05	0.02	0.04	0.04	0.04	0.02	0.03	0.04	0.04
Median	0.53	0.57	0.54	0.63	0.63	0.4	0.42	0.48	0.35	0.55	0.55	0.55	0.55	0.6	0.58	0.64	0.55
Mode	0.43	0.54	0.57	0.54	0.64	0.35	0.55	0.6	0.35	0.55	0.55	0.55	0.4	0.6	0.6	0.5	0.6
Standard Deviation	0.14	0.19	0.22	0.14	0.19	0.24	0.25	0.24	0.24	0.22	0.22	0.2	0.23	0.18	0.17	0.19	0.18
Sample Variance	0.02	0.03	0.05	0.02	0.04	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.05	0.03	0.03	0.03	0.03
Kurtosis	-0.2	0.8	-0.7	-0.7	3.11	-0.9	-0.8	-1	-0.2	-0.6	-0.6	-0.6	-0.5	-0.7	-1.4	-1	-0.4
Skewness	0.07	-0.4	-0.1	-0.1	-0.7	0.23	0.12	0.05	0.61	-0.2	-0.3	-0.3	0.09	0.2	-0.2	0.2	0.34
Range	0.73	1	0.77	0.51	1	0.95	0.85	0.89	0.85	0.92	0.82	0.73	0.9	0.75	0.5	0.65	0.7
Minimum	0.21	0	0.13	0.35	0	0	0	0.06	0	0.08	0.08	0.17	0.1	0.25	0.3	0.35	0.25
Maximum	0.94	1	0.89	0.86	1	0.95	0.85	0.95	0.85	1	0.9	0.9	1	1	0.8	1	0.95
Sum	43.1	48.1	14.3	17.4	16.5	33.9	11	13.3	9.71	44.8	13.6	16.1	15.1	46.9	13.9	17.9	15
Count	81	81	26	28	27	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.03	0.04	0.09	0.05	0.08	0.05	0.1	0.09	0.09	0.05	0.09	0.08	0.09	0.04	0.07	0.07	0.07
			z = 1.38				z = 1.70				z = .87				z = 2.0	z = 1.6	

		Science				*Animal*				*Plant*			
Naturalist		All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more	All	19 or less	20 - 24	25 or more
Mean	0.49	0.47	0.47	0.47	0.48	0.53	0.53	0.53	0.53	0.45	0.46	0.46	0.44
Standard Error	0.02	0.03	0.05	0.04	0.05	0.03	0.05	0.04	0.05	0.02	0.04	0.03	0.05
Median	0.5	0.45	0.45	0.43	0.45	0.54	0.52	0.52	0.54	0.5	0.5	0.5	0.5
Mode	0.67	0.3	0.65	0.3	0.2	0.5	0.92	0.5	0.5	0.63	0.63	0.58	0.63
Standard Deviation	0.21	0.24	0.27	0.22	0.24	0.26	0.28	0.24	0.28	0.2	0.21	0.17	0.23
Sample Variance	0.04	0.06	0.07	0.05	0.06	0.07	0.08	0.06	0.08	0.04	0.05	0.03	0.06
Kurtosis	-0.9	-0.8	-0.6	-0.7	-1.1	-0.9	-1.2	-0.7	-0.7	-0.8	-0.8	0.12	-1.2
Skewness	-0.2	0.12	0.18	0.29	-0.1	-0.1	-0	-0.2	-0.1	-0.4	-0.5	-0.7	-0.2
Range	0.81	0.95	0.95	0.8	0.85	1	0.92	0.83	1	0.81	0.75	0.69	0.81
Minimum	0.06	0	0	0.1	0.05	0	0.04	0.08	0	0	0	0.06	0
Maximum	0.88	0.95	0.95	0.9	0.9	1	0.96	0.92	1	0.81	0.75	0.75	0.81
Sum	39.8	38.2	12.3	13.1	12.8	42.8	13.7	14.8	14.4	36.7	12	12.9	11.8
Count	81	81	26	28	27	81	26	28	27	81	26	28	27
Confidence Level(95.0%)	0.05	0.05	0.11	0.09	Con 0.09	0.06	0.11	0.09	0.11	0.05	0.09	0.07	0.09

APPENDIX N

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY ETHNICITY

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY ETHNICITY

		Appreciation			*Instrument*			*Vocal*			*Composer*		
Music		All	Minority	White	All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.47	0.58	0.59	0.58	0.31	0.25	0.34	0.39	0.41	0.38	0.41	0.41	0.42
Standard Error	0.02	0.02	0.05	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.03	0.06	0.04
Median	0.46	0.63	0.58	0.63	0.25	0.25	0.38	0.42	0.44	0.38	0.38	0.38	0.38
Mode	0.59	0.75	0.5	0.75	0.13	0	0.13	0	0	0.25	0.13	0.25	0.13
Standard Deviation	0.2	0.22	0.25	0.21	0.29	0.24	0.3	0.28	0.27	0.29	0.3	0.3	0.3
Sample Variance	0.04	0.05	0.06	0.04	0.08	0.06	0.09	0.08	0.08	0.08	0.09	0.09	0.09
Kurtosis	-0.5	-0.1	0.22	-0.4	0.16	2.21	-0.4	-1.1	-1.2	-1	-1.2	-1.2	-1.2
Skewness	-0	-0.6	-0.6	-0.5	0.95	1.29	0.77	0.24	-0.2	0.45	0.24	0.23	0.22
Range	0.83	0.96	0.96	0.82	1	1	1	1	0.88	1	1	0.88	1
Minimum	0.04	0	0	0.1	0	0	0	0	0	0	0	0	0
Maximum	0.88	0.96	0.96	0.92	1	1	1	1	0.88	1	1	0.88	1
Sum	38	47.3	15.8	30.8	25.1	6.88	18.1	31.6	11	20.2	33.4	11.1	22.1
Count	81	81	27	53	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.04	0.05	0.1	0.06	0.06	0.1	0.08	0.06	0.11	0.08	0.07	0.12	0.08
		z = .18			z = 1.45			z = .46			z = .14		

		Athletic			*Dexterity*		
Kinesthetic		All	Minority	White	All	Minority	White
Mean	0.48	0.53	0.59	0.5	0.43	0.45	0.42
Standard Error	0.02	0.03	0.04	0.04	0.02	0.04	0.03
Median	0.46	0.54	0.63	0.5	0.42	0.42	0.38
Mode	0.4	0.08	0.42	0.5	0.38	0.38	0.33
Standard Deviation	0.18	0.27	0.23	0.28	0.19	0.19	0.18
Sample Variance	0.03	0.07	0.05	0.08	0.03	0.04	0.03
Kurtosis	-0.2	-1	0.16	-1.2	-0.3	-0.5	-0.2
Skewness	-0.1	-0.1	-0.6	0.12	0.32	0.39	0.29
Range	0.83	0.92	0.83	0.92	0.83	0.71	0.83
Minimum	0.06	0.04	0.08	0.04	0.04	0.13	0.04
Maximum	0.9	0.96	0.92	0.96	0.88	0.83	0.88
Sum	38.9	42.7	15.8	26.4	34.7	12.1	22.1
Count	81	81	27	53	81	27	53
Confidence Level(95.0%)	0.04	0.06	0.09	0.08	0.04	0.08	0.05
		z = 1.54			z = .68		

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY ETHNICITY

		School Math			*Logic Games*			*Everyday Math*			*Problem Solving*		
Mathematical		All	Minority	White	All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.49	0.41	0.42	0.41	0.47	0.46	0.48	0.44	0.43	0.44	0.6	0.57	0.62
Standard Error	0.02	0.03	0.05	0.04	0.02	0.04	0.03	0.03	0.05	0.03	0.03	0.05	0.03
Median	0.49	0.38	0.42	0.33	0.44	0.5	0.44	0.45	0.4	0.5	0.58	0.58	0.58
Mode	0.38	0.25	0.25	0.25	0.38	0.56	0.38	0.55	0.35	0.5	0.58	0.58	0.58
Standard Deviation	0.17	0.27	0.27	0.27	0.21	0.21	0.21	0.24	0.24	0.25	0.23	0.24	0.22
Sample Variance	0.03	0.07	0.07	0.07	0.04	0.04	0.04	0.06	0.06	0.06	0.05	0.06	0.05
Kurtosis	-0.6	-1	-0.6	-1.2	-0.6	-0.2	-0.8	-0.9	-0.4	-1	-0.6	-0.5	-0.4
Skewness	-0	0.34	0.43	0.34	0.02	-0.5	0.23	0.18	0.24	0.14	-0	0.31	-0.1
Range	0.81	1	1	0.92	0.88	0.81	0.81	0.95	0.95	0.9	0.92	0.83	0.92
Minimum	0.06	0	0	0	0	0	0.06	0	0	0.05	0.08	0.17	0.08
Maximum	0.88	1	1	0.92	0.88	0.81	0.88	0.95	0.95	0.95	1	1	1
Sum	39.4	33.5	11.4	21.5	38.3	12.5	25.4	35.6	11.6	23.6	49	15.5	32.7
Count	81	81	27	53	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.04	0.06	0.11	0.08	0.05	0.08	0.06	0.05	0.09	0.07	0.05	0.09	0.06
			z = .16			z = .40			z = .17			z = .91	

		Spatial Awareness			*Art Design*			*Working with Objects*		
Spatial		All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.54	0.6	0.62	0.58	0.5	0.49	0.51	0.54	0.54	0.53
Standard Error	0.02	0.02	0.04	0.03	0.03	0.04	0.03	0.02	0.03	0.02
Median	0.55	0.6	0.7	0.6	0.5	0.5	0.5	0.56	0.5	0.56
Mode	0.61	0.7	0.35	0.5	0.5	0.4	0.5	0.56	0.5	0.56
Standard Deviation	0.16	0.21	0.23	0.21	0.24	0.22	0.25	0.18	0.18	0.18
Sample Variance	0.03	0.05	0.05	0.04	0.06	0.05	0.06	0.03	0.03	0.03
Kurtosis	-0.1	-0.6	-0.5	-0.6	-0.4	0.46	-0.7	-0.1	0.83	-0.5
Skewness	-0	-0.2	-0.3	-0.2	-0.1	-0.4	0.06	-0.4	-0.5	-0.3
Range	0.77	0.9	0.9	0.85	1	0.95	1	0.79	0.79	0.75
Minimum	0.17	0.1	0.1	0.15	0	0	0	0.08	0.08	0.13
Maximum	0.94	1	1	1	1	0.95	1	0.88	0.88	0.88
Sum	43.7	48.3	16.8	30.9	40.7	13.1	27	43.5	14.7	28.1
Count	81	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.04	0.05	0.09	0.06	0.05	0.09	0.07	0.04	0.07	0.05
			z = .76			z = .37			z = .24	

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY ETHNICITY

		Expressive			*Rhetorical*			*Written/Reading*		
Linguistic		All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.5	0.44	0.43	0.45	0.63	0.62	0.63	0.51	0.47	0.53
Standard Error	0.02	0.02	0.04	0.03	0.02	0.03	0.02	0.02	0.04	0.03
Median	0.47	0.46	0.46	0.5	0.67	0.67	0.67	0.5	0.5	0.5
Mode	0.62	0.54	0.43	0.54	0.67	0.67	0.67	0.5	0.63	0.56
Standard Deviation	0.18	0.21	0.21	0.21	0.14	0.16	0.13	0.21	0.22	0.2
Sample Variance	0.03	0.04	0.04	0.04	0.02	0.03	0.02	0.04	0.05	0.04
Kurtosis	-0.9	-0.6	-1.1	-0.4	1.74	0.92	2.6	-0.7	-1.2	-0.4
Skewness	0.09	-0	-0.1	0	-1	-0.6	-1.2	-0	-0.1	0.07
Range	0.72	0.96	0.71	0.96	0.8	0.69	0.8	0.88	0.75	0.81
Minimum	0.16	0	0.04	0	0.17	0.25	0.17	0.06	0.06	0.13
Maximum	0.88	0.96	0.75	0.96	0.97	0.94	0.97	0.94	0.81	0.94
Sum	40.7	35.9	11.6	23.9	50.9	16.7	33.5	41.3	12.8	28.2
Count	81	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.04	0.05	0.08	0.06	0.03	0.06	0.04	0.05	0.09	0.05
			z = .40			z = .28			z = 1.19	

		Personal Knowledge			*Sensitivity*			*Working with People*		
Interpersonal		All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.63	0.59	0.62	0.57	0.6	0.61	0.6	0.58	0.56	0.59
Standard Error	0.02	0.02	0.04	0.03	0.02	0.05	0.03	0.02	0.05	0.03
Median	0.67	0.58	0.67	0.5	0.58	0.58	0.57	0.58	0.58	0.58
Mode	0.67	0.5	0.83	0.5	0.75	0.75	0.57	0.67	0.67	0.58
Standard Deviation	0.14	0.21	0.22	0.21	0.21	0.26	0.19	0.22	0.26	0.2
Sample Variance	0.02	0.05	0.05	0.04	0.05	0.07	0.04	0.05	0.07	0.04
Kurtosis	3.93	-0.7	-1	-0.5	-0.4	-0.4	-0.9	-0	0.08	-0.8
Skewness	-1.4	0.1	-0.2	0.28	-0.2	-0.4	0.16	-0.4	-0.7	0.01
Range	0.91	0.83	0.83	0.83	1	1	0.79	1	1	0.83
Minimum	0.03	0.17	0.17	0.17	0	0	0.21	0	0	0.17
Maximum	0.93	1	1	1	1	1	1	1	1	1
Sum	51.2	47.8	16.8	30.3	48.9	16.4	31.8	46.8	15.1	31.1
Count	81	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.03	0.05	0.09	0.06	0.05	0.1	0.05	0.05	0.1	0.06
			z = .98			z = .18			z = .53	

DESCRIPTIVE STATISTICS FOR MI SUBSCALES OF THE STUDY POPULATION BY ETHNICITY

		Personal Knowledge			*Calculations*			*Problem Solving*			*Effectiveness*		
Intrapersonal		All	Minority	White	All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.53	0.59	0.6	0.59	0.42	0.42	0.42	0.55	0.57	0.54	0.58	0.58	0.58
Standard Error	0.02	0.02	0.05	0.02	0.03	0.04	0.04	0.02	0.04	0.03	0.02	0.04	0.02
Median	0.53	0.57	0.57	0.61	0.4	0.4	0.38	0.55	0.55	0.55	0.6	0.55	0.6
Mode	0.43	0.54	0.43	0.54	0.35	0.35	0.2	0.55	0.5	0.55	0.6	0.35	0.6
Standard Deviation	0.14	0.19	0.24	0.16	0.24	0.22	0.26	0.22	0.22	0.22	0.18	0.22	0.16
Sample Variance	0.02	0.03	0.06	0.02	0.06	0.05	0.07	0.05	0.05	0.05	0.03	0.05	0.03
Kurtosis	-0.2	0.8	0.37	0.34	-0.9	0.14	-1.2	-0.6	-0.1	-0.8	-0.7	-1.3	-0.3
Skewness	0.07	-0.4	-0.4	-0.5	0.23	0.33	0.21	-0.2	-0.1	-0.2	0.2	0.18	0.25
Range	0.73	1	1	0.73	0.95	0.95	0.85	0.92	0.92	0.85	0.75	0.7	0.7
Minimum	0.21	0	0	0.13	0	0	0	0.08	0.08	0.1	0.25	0.25	0.3
Maximum	0.94	1	1	0.86	0.95	0.95	0.85	1	1	0.95	1	0.95	1
Sum	43.1	48.1	16.2	31.4	33.9	11.4	22.1	44.8	15.5	28.7	46.9	15.5	30.7
Count	81	81	27	53	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.03	0.04	0.09	0.04	0.05	0.09	0.07	0.05	0.09	0.06	0.04	0.09	0.04
		z = .20						z = .58					

		Science			*Animal*			*Plant*		
Naturalist		All	Minority	White	All	Minority	White	All	Minority	White
Mean	0.49	0.47	0.43	0.49	0.53	0.45	0.56	0.45	0.44	0.45
Standard Error	0.02	0.03	0.05	0.03	0.03	0.06	0.03	0.02	0.05	0.03
Median	0.5	0.45	0.35	0.5	0.54	0.5	0.54	0.5	0.44	0.5
Mode	0.25	0.3	0.3	0.65	0.5	0.5	0.5	0.63	0.63	0.63
Standard Deviation	0.21	0.24	0.24	0.24	0.26	0.3	0.23	0.2	0.24	0.19
Sample Variance	0.04	0.06	0.06	0.06	0.07	0.09	0.05	0.04	0.06	0.03
Kurtosis	-0.9	-0.8	-0.5	-0.7	-0.9	-1.2	-0.8	-0.8	-0.8	-1
Skewness	-0.2	0.12	0.48	-0	-0.1	0.21	-0	-0.4	-0.4	-0.4
Range	0.81	0.95	0.9	0.9	1	1	0.83	0.81	0.81	0.69
Minimum	0.06	0	0	0.05	0	0	0.13	0	0	0.06
Maximum	0.88	0.95	0.9	0.95	1	1	0.96	0.81	0.81	0.75
Sum	39.8	38.2	11.6	26	42.8	12.3	29.8	36.7	12	24.1
Count	81	81	27	53	81	27	53	81	27	53
Confidence Level(95.0%)	0.05	0.05	0.09	0.07	0.06	0.12	0.06	0.05	0.09	0.05
			z = 1.06			z = 1.67			z = .19	

APPENDIX O

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLES OF THE STUDY POPULATION BY GENDER

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLE OF THE STUDY POPULATION BY GENDER

Leadership	All	Female	Male
Mean	0.56	0.6	0.51
Standard Error	0.02	0.02	0.03
Median	0.54	0.59	0.49
Mode	0.75	0.75	0.5
Standard Deviation	0.16	0.14	0.18
Sample Variance	0.03	0.02	0.03
Kurtosis	-0.1	0.01	-0.2
Skewness	0.08	0.28	0.27
Range	0.81	0.61	0.78
Minimum	0.11	0.31	0.11
Maximum	0.92	0.92	0.89
Sum	45.2	27.4	17.8
Count	81	46	35
Confidence Level(95.0%)	0.04	0.04	0.06
z = 2.45			

General Logic	All	Female	Male
Mean	0.54	0.56	0.52
Standard Error	0.02	0.02	0.02
Median	0.54	0.55	0.54
Mode	0.35	0.35	0.59
Standard Deviation	0.15	0.15	0.15
Sample Variance	0.02	0.02	0.02
Kurtosis	-0.6	-0.7	-0.8
Skewness	-0	0.26	-0.4
Range	0.69	0.62	0.51
Minimum	0.23	0.29	0.23
Maximum	0.91	0.91	0.74
Sum	44	25.8	18.9
Count	81	46	36
Confidence Level(95.0%)	0.03	0.04	0.05
z = 1.19			

Innovative	All	Female	Male
Mean	0.5	0.54	0.44
Standard Error	0.02	0.02	0.03
Median	0.51	0.54	0.47
Mode	0.51	0.65	0.25
Standard Deviation	0.17	0.16	0.17
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.1	0.19	-0.5
Skewness	0.07	0.16	0.04
Range	0.89	0.74	0.71
Minimum	0.06	0.21	0.06
Maximum	0.94	0.94	0.77
Sum	40.2	24.7	15.5
Count	81	46	35
Confidence Level(95.0%)	0.04	0.05	0.06
z = 2.689			

APPENDIX P

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLES OF THE STUDY POPULATION BY AGE

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLES OF THE STUDY POPULATION BY AGE

Leadership	All	19 or less	20 - 24	25 or more
Mean	0.56	0.54	0.59	0.54
Standard Error	0.02	0.03	0.03	0.04
Median	0.54	0.55	0.56	0.5
Mode	0.5	0.64	0.5	0.46
Standard Deviation	0.16	0.14	0.14	0.2
Sample Variance	0.03	0.02	0.02	0.04
Kurtosis	-0.2	-0.8	-0.6	-0.1
Skewness	0.07	-0.1	0.2	0.25
Range	0.81	0.54	0.58	0.81
Minimum	0.11	0.28	0.31	0.11
Maximum	0.92	0.82	0.89	0.92
Sum	44.7	14.2	16.5	14.5
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.06	0.05	0.08

General Logic	All	19 or less	20 - 24	25 or more
Mean	0.54	0.53	0.57	0.53
Standard Error	0.02	0.03	0.02	0.03
Median	0.54	0.58	0.55	0.5
Mode	0.59	0.46	0.59	0.35
Standard Deviation	0.15	0.16	0.12	0.17
Sample Variance	0.02	0.03	0.01	0.03
Kurtosis	-0.6	-0.9	-1.1	-0.4
Skewness	-0	-0.1	0.01	0.32
Range	0.69	0.58	0.39	0.69
Minimum	0.23	0.25	0.35	0.23
Maximum	0.91	0.83	0.74	0.91
Sum	43.4	13.8	15.9	14.3
Count	80	26	28	27
Confidence Level(95.0%)	0.03	0.07	0.04	0.07

Innovative	All	19 or less	20 - 24	25 or more
Mean	0.5	0.5	0.51	0.47
Standard Error	0.02	0.03	0.02	0.04
Median	0.51	0.52	0.52	0.49
Mode	0.51	0.28	0.43	0.33
Standard Deviation	0.17	0.16	0.12	0.22
Sample Variance	0.03	0.03	0.01	0.05
Kurtosis	-0.1	-0.8	0.1	-0.3
Skewness	0.08	0.09	-0.3	0.34
Range	0.89	0.57	0.52	0.89
Minimum	0.06	0.25	0.25	0.06
Maximum	0.94	0.82	0.77	0.94
Sum	39.6	13	14.4	12.8
Count	80	26	28	27
Confidence Level(95.0%)	0.04	0.07	0.05	0.09

APPENDIX Q

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLES OF THE STUDY POPULATION BY ETHNICITY

DESCRIPTIVE STATISTICS FOR MI INTELLECTUAL STYLES OF THE STUDY POPULATION BY ETHNCITY

Leadership	All	Minority	White
Mean	0.56	0.56	0.56
Standard Error	0.02	0.04	0.02
Median	0.54	0.57	0.54
Mode	0.5	0.75	0.47
Standard Deviation	0.16	0.19	0.15
Sample Variance	0.03	0.04	0.02
Kurtosis	-0.2	0.05	-0.5
Skewness	0.07	-0.2	0.31
Range	0.81	0.81	0.61
Minimum	0.11	0.11	0.28
Maximum	0.92	0.92	0.89
Sum	44.7	15.2	29.5
Count	80	27	53
Confidence Level(95.0%)	0.04	0.08	0.04

General Logic	All	Minority	White
Mean	0.54	0.55	0.54
Standard Error	0.02	0.03	0.02
Median	0.54	0.59	0.54
Mode	0.59	0.59	0.35
Standard Deviation	0.15	0.17	0.14
Sample Variance	0.02	0.03	0.02
Kurtosis	-0.6	-0.2	-1
Skewness	-0	-0.2	0.13
Range	0.69	0.69	0.54
Minimum	0.23	0.23	0.29
Maximum	0.91	0.91	0.83
Sum	43.4	14.8	28.6
Count	80	27	53
Confidence Level(95.0%)	0.03	0.07	0.04

Innovative	All	Minority	White
Mean	0.5	0.49	0.5
Standard Error	0.02	0.03	0.02
Median	0.51	0.49	0.51
Mode	0.51	0.58	0.51
Standard Deviation	0.17	0.17	0.17
Sample Variance	0.03	0.03	0.03
Kurtosis	-0.1	0.73	-0.4
Skewness	0.08	0.75	-0.2
Range	0.89	0.69	0.76
Minimum	0.06	0.25	0.06
Maximum	0.94	0.94	0.82
Sum	39.6	13.3	26.3
Count	80	27	53
Confidence Level(95.0%)	0.04	0.07	0.05

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